NOTES FOR SPEAKERS

1991

UNITED NATIONS

ENVIRONMENT & DEVELOPMENT

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FOREWORD

The global balance-sheet is sobering. Since the 1972 United Nations Conference on the Human Environment the gap in living standards between the world's rich and poor has steadily grown. Industrialized countries and some parts of the developing world have prospered, but a billion people live in absolute poverty. Per capita income in the world's 41 poorest countries is well below $300, a sharp contrast to the $14,500 average of developed market-economy countries. Some 70 per cent of the world's income is produced and consumed by 15 per cent of the population. Living standards in Latin America are lower today than in the 1970s. African living standards have slipped to the level of the 1960s.

Information plays a crucial role in economic and social progress, and instant telecommunications have created world-wide markets. But 31 developing countries have no television service, and 34 lack a general-interest daily newspaper. Nine hundred million adults world-wide are illiterate, most of them in developing countries.

What does any of this have to do with the environment? Everything. The disproportionate distribution of the world's wealth mirrors consumption and pollution patterns. Waste and runaway consumption in the industrialized world devour resources, generate pollution and threaten the atmosphere. Poverty and lack of sustainable development in the Third World degrade human and natural resources, and eat away at environmental assets. Lack of information about technology and ignorance of the impact of human actions hinder development and threaten the environment.

The UN system contributes to the store of knowledge about the planet's economic growth and its social and environmental health. It has produced international agreements to protect the environment, promote economic growth and foster respect for human rights. Representatives of Governments and of scientific, academic and business communities meet increasingly under UN auspices to exchange information and consult on ways to develop human potential and protect the environment.

Our understanding of how human behaviour and the environment interact is incomplete. The concept of "sustainable development" and how to achieve it are intensely debated. This edition of *Notes for Speakers*, published in anticipation of Earth Summit '92—the UN Conference on Environment and Development—provides an overview of the UN system's efforts to develop the concept and put it into practice. We hope that those who speak or teach about the UN, environment and development will find *Notes for Speakers* useful and thought-provoking.

Thérèse P. Sévigny
Under-Secretary-General
for Public Information

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EARTH SUMMIT '92: THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

UNITED NATIONS

"The primary goal of the Summit will be to lay the foundation for a global partnership between developing and more industrialized countries, based on mutual need and common interests, to ensure the future of the planet. . . .We need to find a viable and equitable balance between environment and development."

Maurice Strong, Secretary-General
United Nations Conference
on Environment and Development

The first-ever "Earth Summit"—the UN Conference on Environment and Development (UNCED)—will take place in Rio de Janeiro, Brazil, from 1 to 12 June 1992.

A highlight of the Conference will be the observance of World Environment Day on 5 June 1992, the twentieth anniversary of the opening of the UN Conference on the Human Environment, held at Stockholm, Sweden, in 1972.

In Stockholm, environment was placed on the world agenda. The Brazil Summit will ensure that the issue becomes central to policy-making and implementation in almost every sector of economic life. It will seek agreements on concrete measures to reconcile economic activities with the need to protect the planet and ensure a sustainable future for all people.

The UN General Assembly has decided that Member States should be represented at the Conference by heads of State or Government. International organizations, non-governmental groups and private-sector interests will also take part in an unprecedented attempt to mobilize people to set a new and more hopeful course for the future of humanity.

Background

The relationship between economic development and environmental impact was recognized at the Stockholm Conference. It was also the focus of *Our Common Future*, the 1987 report of the UN World Commission on Environment and Development (Brundtland Commission). However, between 1972 and 1987, too little was done to integrate, in practical terms, concerns for development and the environment in economic planning and decision-making. Progress was

made in specific instances, but overall the environment of the planet deteriorated. Ozone depletion, global warming and other major environmental problems grew more serious.

In December 1989, the General Assembly called for a conference that would take steps to reverse trends and establish the basis for a sustainable way of life on the planet as we move into the 21st century.

The issues at stake

In an effort to maintain the quality of the environment and achieve environmentally sound, sustainable development in all countries, the Conference will address:

- **protection of the atmosphere *(climate change, depletion of the ozone layer, transboundary air pollution);***
- **protection of land resources *(combating deforestation, soil loss, desertification and drought);***
- **protection of freshwater resources;**
- **protection of oceans, seas and coastal areas, *and the rational use and development of their living resources;***
- **environmentally sound management of biotechnology and hazardous wastes *(including toxic chemicals);***
- **prevention of illegal traffic in toxic products and wastes;**
- **improvement in the quality of life and human health;**
- **improvement in living and working conditions of the poor *by eradicating poverty and stopping environmental degradation.***

The Conference will look at underlying patterns of development which cause stress to the environment. Poverty in developing countries, levels of economic growth, unsustainable patterns of consumption, demographic pressures and the impact of the international economy are development issues that will be addressed.

Earth Summit objectives

The Conference is expected to produce:

- **an *Earth Charter* that will embody basic principles which must govern the economic and environmental behaviour of peoples and nations to ensure ''our common future'';**
- **Agenda 21, *a blueprint for action in all major areas affecting the relationship between the environment and the economy. It will focus on the period up to the year 2000 and extend into the 21st century;***
- ***the means to carry out the Agenda by making available to developing countries the additional financial resources and environmentally sound technologies they require to participate fully in global environmental cooperation and to integrate environmental considerations into development policies and practices;***

- **agreement on strengthening institutions *in order to implement these measures;***
- **conventions on climate change, biological diversity and, perhaps, forestry *which may be negotiated prior to the Conference and signed or agreed to in Brazil.***

National reports

Countries are preparing national reports for the Conference according to guidelines adopted by the UNCED Preparatory Committee to reflect their experiences and perspectives on environment and development. Non-governmental organizations (NGOs) and citizen groups are expected to participate in the preparation of the reports, which should be submitted to the UNCED secretariat no later than July 1991.

Developing-country participation

Developing countries have an important stake in the Summit: their participation in the Conference and its preparations is critical for its success. They fully share the hazards resulting from global environmental damage, although the problem has been caused mostly by the activities of industrialized countries which have also gained most of the economic benefits.

The cooperation of developing countries is essential if the integrity of the environment is to be secured. Such cooperation can be expected only if the development of these countries is given new impetus and direction.

Supplementary funding and technology must be made available to developing countries to enable them to integrate environmental concerns into development programmes and make the transition to sustainable development. Agreement on this will be the most important challenge confronting the 1992 Conference.

Non-governmental participation

The *Earth Summit* will be a conference of leaders of Governments but its success will depend largely on the interest and support of peoples and their active participation in NGOs and citizen groups which will contribute to its preparations. Provision has been made for relevant NGOs to participate in meetings of the Preparatory Committee. A parallel event will be held by non-governmental groups in Rio de Janeiro at the time of the Summit.

ENVIRONMENT AND DEVELOPMENT: AN OVERVIEW

UNITED NATIONS

"The environment is where we all live; development is what we all do in attempting to improve our lot within that abode. The two are inseparable."

Gro Harlem Brundtland, Prime Minister of Norway
Foreword to *Our Common Future: Report of the World Commission on Environment and Development*

Mother to child: "What are you doing?"

Child: "I don't know. I haven't finished it yet."

Unknown

A controversial 1968 article* described what the author, Garrett Hardin, called "the Tragedy of the Commons", produced when society surpasses or abandons traditional means for regulating use of the environment.

- **"Picture a pasture open to all . . . It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. [T]he rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another, and another. . . But this is the conclusion reached by each and every rational herdsman sharing a commons." Each member of the community is locked into a system that compels him to increase his herd without limit—in a world that is limited. By pursuing his own best interest in a society that believes in the freedom of the commons, each contributes to the ruin of all.**

This illustration could apply equally to industrialized society.

- **"The rational man finds that his share of the cost of the wastes he discharges into the commons is less than the cost of purifying his wastes before releasing them. Since this is true for everyone, we are locked into a system of fouling our own nest, so long as we behave only as independent, rational free-enterprisers."**

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* Garrett Hardin, "The Tragedy of the Commons", *Science* magazine; December 1968.

Using herds of cattle or hordes of cars, this simple scenario illustrates how the quality of a community's environment depends on the sustainability of its development, and that both environment and development hinge on the behaviour of individuals.

In many developing countries, *poverty* forces individuals to over-use grazing lands and to deforest vast areas for fuelwood or marginal agriculture. It spreads disease by depriving communities of clean water and adequate sanitation. Even where poverty is less extreme, lack of technology for curbing industrial pollution or improving energy efficiency, and lack of education, training and financial resources, result in wasted resources and environmental damage. *Affluence* in industrialized countries provides an immense variety of material goods and comforts, but also fouls the air and water with pollutants, generates hazardous wastes, and creates enormous demands for energy.

We have begun to understand that ignorance of the environmental impact of our actions, lack of cooperation to preserve resources essential to all, and lack of options—particularly for the world's poor—threaten tragedy on a global scale.

- **People can damage the environment unintentionally in their attempts to improve their lives, or merely to survive. When they actually set out to destroy, the environment is among the first casualties, as the recent conflict in the Persian Gulf tragically illustrates.**

- **A task force of UN agencies, convened by the United Nations Environment Programme, has drawn up a plan to survey and assess the environmental damage of the conflict. The survey will be the basis for concrete proposals to deal with marine, coastal and atmospheric pollution, destruction of soil, water and food resources, and hazardous wastes. UNEP organized a Geneva meeting in March 1991 which assigned responsibilities to a dozen UN agencies and other organizations, including the International Union for Conservation of Nature and Natural Resources (IUCN) and the World Wide Fund for Nature. Between 30 and 40 experts will carry out the initial surveys and assessments.**

Sustainable development: the key to Our Common Future

In 1987 the World Commission on Environment and Development presented its report to the UN General Assembly. The report, *Our Common Future*, had taken three years to compile and provoked an intense re-examination of development policies and practices in developing and industrialized countries alike. Its central conclusion is that our understanding of "environment" and "development" must be integrated to achieve "sustainable development" which "meets the needs of the present without compromising the ability of future generations to meet their own needs."

Sustainability is about progress, growth, the generation of wealth and the use of resources within the limits of ecological possibility. Achieving it means fundamentally changing individual behaviour, and requires international cooperation towards immediate goals, including:

- **reviving growth: poverty undermines people's capacity to use resources wisely;**

- **urgently finding patterns of growth that are less energy-intensive;**

- **meeting the essential needs of the developing world's expanding population, while working to achieve a sustainable, stabilized world population level;**
- **conserving and enhancing the resource base through alternative means of production and consumption;**
- **reorienting technologies to meet the challenges of increased consumption and reduced use of resources;**
- **merging environmental and economic concerns in decision-making at all levels.**

The UN role

Bound by its Charter to promote international cooperation on economic, social, cultural and humanitarian problems as a "centre for harmonizing the actions of nations", the United Nations, and its related organizations, are contributing to efforts to mitigate Hardin's "tragedy" on a global scale. For more than four decades, and particularly since the 1972 *UN Conference on the Human Environment* in Stockholm, the UN system has contributed to the understanding of the intimate relationship between economic activity—that is to say, development—and the environment: the "commons" on which human life depends for survival. The United Nations and its specialized agencies have played a variety of roles:

- **as clearing-houses for technical and scientific information;**
- **as suppliers of technical assistance;**
- **as catalysts for joint action; and**
- **as forums where national Governments address the entire range of political, economic and social questions.**

Nothing new under the sun?

Efficient use and conservation of resources to improve standards of living were among the United Nations' first concerns. A *1949 UN Scientific Conference on the Conservation and Utilization of Resources* brought together for the first time scientists and experts in the context of the Charter articles which call for the Organization to promote economic and social development. The scope of the Conference was limited by its terms of reference and by the post-war world's lop-sided, still-colonial geography. It generated technical papers and discussion on natural resource issues which emphasized management of scarce resources to promote economic expansion for growing populations. The statements of participants have found frequent echoes in later conferences:

- **"No citizen has the right to damage his fellow citizens by reckless and wasteful use of resources . . . Natural resources are interrelated and must be developed and conserved together for maximum benefit . . . The vicious circle of no capital and no development (in underdeveloped regions) must and can be broken."**

Industrial pollution, management of hazardous wastes, rural-urban migration, the fouling of oceans and seas, and the prospect of climate change are all absent from the 1949 report. Concerns over these issues have grown as scientists and the public at large have learned more about the environmental costs of the 20th century's unprecedented economic and industrial growth. Developing countries have had to struggle with the environmental and developmental problems of two eras simultaneously: the natural resource issues which dominated discussion at the 1949 Conference, as well as those of industrialization.

Prelude to Stockholm

The international environmental movement that generated the Stockholm Conference has a long history but no sharp beginning. Nature conservation movements in Europe and North America date back to the 19th century. Public debate in these countries over the environmental impact of human economic activities gathered steam in the 1950s and 1960s.

- **Air pollution episodes in London and New York between 1952 and 1966; fatal industrial poisonings in Minimata and Niigata, Japan, between 1953 and 1965; oil pollution which damaged the coast of France in 1966; and early evidence of the rise of carbon dioxide concentrations contributed to a growing fear in developed countries that the negative impact of economic development—pollution—was jeopardizing the human future.**

- **The *International Geophysical Year (IGY)*, 1957-1958, supported by the UN Educational, Scientific and Cultural Organization (UNESCO) and other parts of the UN system, promoted world-wide observation of the upper atmosphere and coordinated study of remote areas like the Antarctic. The *International Biological Programme*, an offshoot of IGY, focused for a decade between 1964 and 1974 on biological productivity and human welfare. These and other programmes undertaken by the UN system's specialized agencies—including UNESCO, the World Meteorological Organization (WMO), the Food and Agriculture Organization of the UN (FAO) and the World Health Organization (WHO)—and other organizations contributed to the store of knowledge about the relationships between human behaviour and the environment. By 1970 many UN agencies had programmes devoted to environmental issues.**

- **Publications like Rachel Carson's *Silent Spring* sounded the alarm about environmental damage and health risks from excessive use of pesticides and other agricultural chemicals introduced in the 1940s and 1950s.**

Developing and industrialized countries were sharply divided on environmental issues. *Industrialized countries* were concerned with environmental pollution, conservation of genetic and natural resources, and the pressures on resources and energy supplies created by growing populations. *Developing countries* tended to dismiss environmental concern as the business of rich countries. Their energy and resource consumption were not high; industrial pollution was localized, if at all present. What concerned them was poverty and its effects: short life expectancies, infectious diseases, inadequate shelter, water and sanitation. They were tempted to industrialize by the cheapest route first and cure pollution later, using as a comparative advantage their willingness to accept industries which had become intolerable in the more developed world.

At Stockholm, representatives of developing and industrialized countries began to understand their different perspectives. Developing countries recognized that industrialized countries had historically encountered environmental problems familiar to the developing world: resource deterioration, squalid housing and lack of sanitation. Both sides came to appreciate that in the less developed countries most environmental problems were the result of underdevelopment. Environmental problems like droughts or water-borne diseases had long hindered the South's development. A new appreciation also emerged for traditional agriculture and environmental management practised by many communities in developing countries.

A start at reconciling the seemingly opposite views of the industrialized and developing countries was one of the Stockholm Conference's greatest challenges, and one of its most important achievements. The interplay between these two world views led to the emergence of the idea of *"ecodevelopment"*—ecologically sound, positive management of the environment for human benefit.

Environment and development on the agenda *together*

The Stockholm Conference took an important step towards protecting the "global commons" from tragedy. It declared that "States have the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction". The Conference also stressed that economic and social development and protection of the environment depended on one another, and that resources should be made available to the developing countries to accelerate their development.

Another important outcome of the 1972 Conference was a new, three-pronged approach in the UN system to environmental issues:

- **more intensive and coordinated assessment of the global environment;**
- **better management of the environment through international agreements and commonly agreed goals on such questions as protection of ocean resources and endangered species;**
- **support for these initiatives through such activities as specialist training, public information and technical assistance.**

The UN Environment Programme (UNEP) was created to draw together the environmental aspects of the UN system's activities. Supported by a small secretariat based at Nairobi with a world-wide professional staff of 170, UNEP has, since 1974, served as environmental catalyst and conscience to the UN system. *"Earthwatch"*—a set of related activities coordinated by UNEP to improve the gathering and sharing of information about the global environment—addressed the Stockholm Conference's first objective.

- **The *International Information System on the Environment (INFOTERRA)* promotes the exchange of environmental information between national agencies through a network of national focal points and regional centres and other organizations.**

- **The *Global Environmental Monitoring System (GEMS)* aims to meet the demand for knowledge about the environment and the impact of human activities by providing a link between hundreds of national and international organizations which monitor: changes in the atmosphere and climate; freshwater, coastal and air pollution; food contamination; deforestation; ozone-layer depletion; the build-up of greenhouse gases; acid rain; the extent of global ice cover; and issues related to biological diversity.**

- **The *International Register of Potentially Toxic Chemicals (IRPTC)*, maintained by UNEP, provides information on the chemical make-up of these products, their degree of toxicity, use, storage and disposal, and regulations applied to them in different countries.**

From monitoring to managing

Further evidence of an emerging global consciousness of the importance of shared resources was seen in the concept that certain resources are "the common heritage of mankind". This principle, initially articulated in 1970 by the General Assembly, became central to the Third UN Conference on the Law of the Sea.

- **The product of the Conference, a single *UN Convention on the Law of the Sea*, was adopted in 1982 after nearly a decade of negotiation between more than 160 countries. The Convention provides a legal framework and institutions for managing and preserving the marine environment on a scale never before attempted. The Convention is not yet in force. Although it has been signed by 159 countries, only 44 of the 60 required ratifications have been received. But adoption of the Convention marked a new chapter in international cooperation. Developing countries, most of them former colonies which had had no role in the development of international law governing the uses of the seas, played a full role in negotiating the Convention. Many countries have already begun revising national laws to reflect the Convention's principles and provisions.**

Concurrently with the Law of the Sea negotiations came a succession of UN system conferences, among them major meetings on population and food (1974), human settlements (1976), water (1977), desertification (1977), primary health care (1978), agrarian reform and rural development and science and technology for development (1979), and new and renewable sources of energy (1981).

- **These meetings prompted Governments and NGOs to examine how environmental factors affect economic and social development, and how human behaviour—from land ownership and traditional agricultural practices to industrialization—affects the environment. In some countries, these conferences resulted in the first national soil maps, assessments of freshwater resources, and policies for national food security or housing.**

During the same period, UNEP launched the first of its efforts promoting international agreements for managing shared resources.

- **The 1976 Convention for the Protection of the Mediterranean Sea against Pollution, negotiated under UNEP's auspices by the countries sharing the Mediterranean, was the first of a series of efforts to improve the environment of regional seas. The Convention has served as a precedent for other**

agreements—such as the 1985 Vienna Convention and Montreal Protocol to safeguard the ozone layer, the Basel Convention to control international traffic of hazardous wastes, and the 1979 Convention on Long-range Transboundary Air Pollution—where many countries must coordinate their efforts to deal with environmental problems which are by-products of, and ultimately threats to development.

A case of self-interest: environment and development in the 1980s

During the 1980s the idea that the richer, more industrialized countries have a direct interest in the development of others gained ground. The Organisation for Economic Cooperation and Development (OECD) Interfutures Study, the Brandt Commission report and the World Conservation Strategy published by the IUCN in cooperation with UNEP and WWF struck a common chord: conservation of the biosphere's resources is at the heart of environmentally sound development, and without development, resources are unlikely to be available to protect the world's wildlife and natural environments.

- **The 1980s saw uneven and sluggish growth in the world economy, and a decline in the living standards of the poorest. Some newly industrializing countries achieved significant, and occasionally spectacular, growth. But most developing countries suffered from economic decline created in many cases by drops in international prices for their principal exports and by debt. The external debt of the developing world totalled more than $1 trillion at the end of the decade. Debt service accounted for a huge outflow of resources from developing countries to industrialized countries and lending institutions in the North. The yearly outflow averaged some $30 billion in the second half of the decade.**

- **Interest payments to foreign lenders leave less money to invest in development at home. Reduced public spending in many developing countries has been accompanied by increasing infant mortality, growing malnutrition, and the reappearance of diseases previously thought eradicated. Under such conditions, environmental considerations take second place to export earnings, employment, and daily survival of the population.**

The General Assembly's consideration of the Brundtland Commission report in 1987 boosted the idea that economic and environmental thinking need to be interwoven. Recommendations and ideas contained in *Our Common Future* were incorporated in the Assembly's 1987 *Environmental Perspective to the Year 2000 and Beyond*, intended as a framework for efforts at all levels to achieve a transition to environmentally sound development.

In 1989, the Assembly decided to convene UNCED in June 1992, at the highest level of participation. *Earth Summit*, as the Conference is now termed, will take place from 1 to 12 June 1992 in Rio de Janeiro, at the invitation of Brazil. Its outcome will be a measure of the change in official attitudes towards "sustainable development".

Needed: mechanisms and money

Putting sustainable development into practice, managing the global commons, and coordinating efforts across the entire spectrum of human activities are Herculean tasks. *Earth Summit* will address the need for international mechanisms able to cope with these tasks.

Governmental and institutional thinking is already evolving. It is now generally accepted, for example, that additional concessionary funding is needed to help developing countries protect the environment, particularly the global commons, without hindering their development.

- **A multilateral fund, initially set at $160 million, has been created to help developing countries obtain the ozone-friendly technology needed to make the Montreal Protocol to protect the ozone layer effective. The Fund will grow by $80 million when both China and India ratify the Protocol.**

- **A $1 billion *Global Environmental Facility* operated jointly by the World Bank, UNEP and the UN Development Programme (UNDP) will finance projects and training programmes in middle- and low-income countries to help reduce destruction of the ozone layer, counter global warming, halt the loss of biological diversity and prevent pollution of the oceans. This initiative and other policies signify a shift towards integrating environmental and economic considerations in the institutional thinking at intergovernmental financial institutions.**

- **The International Monetary Fund Executive Board has called for the IMF staff to develop a greater understanding of the interplay between economic policies, economic activity and environmental change by drawing on the expertise of other institutions. The Board hopes this awareness will help the Fund avoid policies with negative environmental consequences, while ensuring sustainable growth and reduction of poverty.**

These developments are welcome, but the sums are hardly equal to the task. Conservation of the planet's biodiversity—its variety of plant and animal life—is a case in point. Development of new crop varieties in agriculture and creation of new drugs for fighting disease often depend upon the genetic wealth of the world's natural species. But people in some countries are forced to destroy the environment to provide themselves with food, fuel and other resources which those in industrialized countries often take for granted. Day-to-day survival of individuals is, under these conditions, tragically at odds with the survival of entire species. One goal of development assistance must be to provide the world's poor with alternatives to destroying habitats.

- **UNEP Executive Director Mostafa Tolba has pointed out that the overall flow of assistance to developing countries for conservation of biological diversity is roughly estimated at $230 million a year. The World Resources Institute (WRI) estimates that we should be spending between $20 billion and $50 billion on natural resources conservation. Only a little over 3 per cent of the Earth's surface is protected, and much of this protection exists only on paper. In many developing countries, park services are understaffed, underfunded and demoralized.**

The atmosphere: the ultimate global "commons"

Information can change attitudes and lead to action. Achievement of the Vienna and Montreal agreements to protect the ozone layer, coordinated by UNEP, was in large part the result of a series of assessments of the ozone layer conducted under UN-system auspices beginning in 1977. Knowledge of another phenomenon—global warming, or the "greenhouse effect"—

has developed considerably since the first meeting of scientists convened by WMO, UNEP and a non-governmental group, the International Council of Scientific Unions (ICSU), in 1986. Human behaviour, including the burning of fossil fuels, use of agricultural and industrial chemicals and destruction of forests, now rivals the forces of nature in determining Earth's climate.

- **Since 1988, the scientists of the *Intergovernmental Panel on Climate Change (IPCC)*, working under the auspices of WMO and UNEP, have examined the scientific evidence of global warming, its likely impact and possible policy responses. In August 1990, IPCC concluded that if the increase of greenhouse gas concentrations is not limited, the predicted climate change would place stresses on natural and social systems unprecedented in the past 10,000 years.**

- **The Second World Climate Conference, convened by agencies of the UN system and ICSU in November 1990, concluded that despite scientific and economic uncertainties, nations should now take national and regional steps towards reducing emissions and increasing "sinks" of greenhouse gases—such as forests. The Conference urged nations to negotiate a convention on climate change without delay, with the aim of signing it in 1992. In February 1991, the first negotiating session towards such a convention was held.**

Warning: poverty is dangerous to your planet's health . . .

Global warming and the prospect of climate change reveal the complexity of the relationships between environment and development. They illustrate—perhaps better than any other set of problems—that success in dealing with environmental problems requires close cooperation between industrialized and developing countries. Knowledge, expertise, technology and financial resources must be shared.

The Second World Climate Conference pointed out that possible climate change is largely the consequence of past patterns of economic growth in the industrialized countries. Much-needed economic growth in the developing countries could play an important role in determining the rate of climate change.

- **Developing countries are being asked to help deal with environmental damage from prior industrialization. If they are to avoid the potentially disastrous course followed by industrialized countries in the past, they need modern technologies, particularly for energy efficiency.**

- **Developing countries have provided data and participated to a degree in the research and meetings on global warming. But their lack of trained personnel, access to technology and financial resources prevent them from benefiting fully from the results. The Second World Climate Conference concluded that "a massive and sustained flow of scientific and technological expertise towards the development of the intellectual resources, technical and institutional capacity of the developing countries is a necessary complement to the efforts of those countries".**

. . . and so is greed

Global warming also reveals the urgent need for a change in attitudes on the part of the world's richer inhabitants, particularly in industrialized countries. It calls into question the lifestyles of

those who have achieved, or hope to achieve, "higher" stages of development. Two decades ago, in their work *Only One Earth*, Barbara Ward and René Dubos addressed the question of attitudes towards consumption:

- **"Is there a kind of biological limit to man's desire for food, shelter, leisure, entertainment, talking by telephone, moving about in a motor car, flying in airplanes, visiting distant lands? . . .We do not know. Standards are still set for society by the luxury of the very rich purveyed to all by television . . . Perhaps no modernized societies have reached a consensus on what a 'good life' means in economic terms save in relation to reaching other people's higher levels."**

In 1972 *Only One Earth* raised the issues of pollution and possible climate change caused by excessive consumption and industrial development, and pointed out that these threats had emerged

- **"...with a world population of less than four billion, at least half of whom have hardly raised their claims on the planet above those of neolithic man . . . Suppose seven billion try to live like Europeans or Japanese? Suppose they seek American standards of automobile use and add the emission of three and a half billion cars to the carbon monoxide in the air and the lungs?"**

We might reframe these questions: Suppose those in the industrialized world cut their use of energy and resources? Suppose people in the developing world had access to energy- and resource-efficient technologies and the education and training to operate them? Growing populations need growing economies based on sustainable development, if the environment is to survive.

- **The UN bodies concerned with population issues constantly monitor the global population situation and policies. The United Nations estimates the world population in mid-1991 at 5.4 billion, and growing faster than ever before, at a rate of about 93 million per year. It projects that by the year 2000, another billion people will live on the planet; by the year 2025, population is expected to be around 8.5 billion. The developing countries account for 94 per cent of this growth.**

- **Population policies have gained wide acceptance. More than 100 countries have adopted policies aimed at affecting some aspect of population. Developing countries themselves spend some $4 billion on population and family-planning programmes. The international community provides about $420 million—30 per cent less than in 1985. The UN Population Fund (UNFPA) is the largest internationally funded source of population assistance, providing about $200 million annually.**

The dynamics between population, environment and development are not entirely understood. Numbers aren't the whole story. Attitudes towards consumption, models of development, the availability of options, and equity may ultimately prove more critical than numbers. The Brundtland Commission report concluded that meeting essential needs through sustainable development meant not only achieving a new era of economic growth for nations where the majority are poor, but assuring them their fair share of the resources required to sustain that growth. At the global level, sustainable development requires that "those who are more affluent adopt lifestyles within the planet's ecological means"—in their use of energy, for example.

▶ **One person in an industrialized market-economy country uses more than 80 times as much energy as a person in sub-Saharan Africa. Bringing developing countries' energy use up to industrialized country levels by the year 2025 would require five times more global energy use. The planetary ecosystem could not stand this, especially if the increase was based on non-renewable fossil fuels. Conservation and energy efficiency must be the answers for all countries.**

From economizing ecology to ecologizing the economy

A World Bank discussion paper* which examines the implications of the Brundtland Commission report says its basic idea is to incorporate *all* types of capital and resources—natural resources and processes, human knowledge and effort, infrastructure, money and finance—into calculations of national accounts, productivity and development planning. The immediate objective of sustainable development is to "economize ecology" by improving energy efficiency, conserving resources, restoring habitats, monitoring the ecosystem and improving social health. Pollution must be counted as a social cost of development through the "polluter pays" principle.

▶ **The UN Statistical Office is engaged in a major effort to revise the methods for compiling National Accounts Statistics, which measure the wealth and productivity of countries, by incorporating a variety of environmental factors.**

A transition to sustainable development would be a major step towards *ecodevelopment*, which "ecologizes economy" by reinforcing, instead of damaging, links among people, their communities and the biosphere. As an ideal, ecodevelopment would achieve a seamless web which extends from the local community to larger "ecoregions", and ultimately to the entire planetary ecosphere.

Debate about environment and development has turned on alternative, sometimes competing, visions of the future. The World Bank's discussion paper observes that vision is crucial for development: ". . . people must have a vision of a desirable future which inspires them to create it". But the future is rooted in the present. As a participant in the UN's 1949 Scientific Conference on resources put it: "All worth-while resource improvements take time, and no one can be expected to initiate them without a reasonable feeling of security for the future."

The Brundtland Commission report notes that sustainable development will require ". . . a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are made consistent with future as well as present needs . . . Painful choices have to be made . . . in the final analysis, sustainable development must rest on political will".

The 1992 *Earth Summit* will be a measure of how far that political will has advanced.

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* No. 80, Michael E. Colby, *Environmental Management in Development: The Evolution of Paradigms*, World Bank, 1990.

ECONOMICS AND ECOLOGY: A NEED FOR RECONCILIATION

UNITED NATIONS

''We treat nature like we treated workers a hundred years ago. We included then no cost for the health and social security of workers in our calculations, and today we include no cost for the health and security of nature.''

Björn Stigson, head of the Swedish engineering firm AB Fläkt

The economy is the nervous system of the interactions between environment and development. The World Commission on Environment and Development, in its discussion of *''sustainable development''—development which ''meets the needs of the present without compromising the ability of future generations to meet their own needs''*—pointed out that economic and ecological considerations must be integrated in decision-making.

▶ **''We have in the past been concerned about the impacts of economic growth upon the environment. We are now forced to concern ourselves with the impacts of ecological stress—degradation of soils, water regimes, atmosphere, and forests—upon our economic prospects. . . Environmental degradation can undermine economic development'', says the Brundtland report. ''In one area after another, environmental degradation is eroding the potential for development.''**

Human activity is jeopardizing the Earth's productive capacity. Acid rain reduces the productivity of forests and crops. Over-fishing exceeds the regenerative capacity of the world's fish stocks. Ozone layer depletion threatens crop damage and reduced fish catches. Global warming threatens growing conditions in the major cereal-producing areas of the world.

The Brundtland Commission concluded that meeting essential needs, particularly for the world's poor, requires not only a new era of economic growth for nations in which the majority are poor, but assuring them of their fair share of the resources required to sustain that growth.

The biggest polluters

▶ **Canada's Media Foundation has produced a television spot featuring a gigantic animated pig. The pig frolics on a map of North America, while a narrator says ''Five per cent of the people in the world consume *one third* of the planet's resources. . . those people are us.''**

Some of the most worrisome environmental dangers—global warming, ozone layer depletion—are mainly consequences of production and consumption in industrialized countries. These

dangers have not been heeded before, partly out of ignorance, and partly because industry and consumers were unwilling to pay for more environmentally sound processes and products. Failure to take environmental costs of economic activity into account allowed higher economic growth than might otherwise have been the case. Those in industrialized countries ''live better'' as a result, but their comfort and convenience impose world-wide environmental costs.

- **Fewer than 25 per cent of the world's people live in industrialized countries, yet they consume 75 per cent of the world's energy, 72 per cent of all steel production and 85 per cent of all wood products.**

- **Industrialized countries generate about 90 per cent of the world's hazardous waste, emit 74 per cent of atmosphere-warming carbon dioxide and produce virtually 100 per cent of the ozone-damaging chlorofluorocarbons.**

Economy and ecology in developing countries

Affluence and its by-products are the main causes of environmental problems in the industrialized countries: industrial waste and consumer-generated garbage; pollution of air and water by industry, automobiles and agricultural chemicals. Poverty is a main cause of the environmental problems facing developing countries: shrinking forests, eroding soils, more frequent flooding of river basins and plains, overgrazed pastures and expanding deserts, overcrowded cities. Lack of access to new technologies—to improve energy efficiency, for example—adds to these problems.

Helping the poor *and* the environment

Poverty and environmental degradation go hand in hand, not least because the poor suffer most from environmental problems. Unless policies respond to the needs of the poor, degradation will continue. The needs of the poor must be the starting point for Governments and international organizations when they formulate environmental protection policies.

Distribution of wealth and land is extremely important. Landlessness and under-employment encourage over-exploitation of resources. Poor people are unlikely to protect trees, plants and land that they do not believe they will have a continued right to use. The environment and people benefit when poverty—the root cause of environmental degradation in developing countries—is reduced.

- **A Worldwatch Institute paper* on poverty and the environment points out that colonialism left Latin America with the most skewed land ownership in the world, where 1 per cent of landlords commonly own 40 per cent of the arable land. The paper's author relates a scene in which a landless farmer and his son in a Central American country planted their corn on a forested slope: ''The land**

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* No. 92, Alan Durning, *Poverty and the Environment*, Worldwatch Institute, 1989.

was so steep that the son had to be held in place with a rope looped around his waist. As he hopped from furrow to furrow, his father let out slack around the tree trunk." When the observer returned to the spot some time later the farmer, his son and the hillside were gone. "What remained was a reddish, eroded nub—which looked just like the next and the next and the next former hillside."

According to Worldwatch, "nothing incites people to deplete forests, soils or water supplies faster than fear that they will soon lose access to them. Neither hired workers, nor hired managers, nor tenant farmers care for land as well as owners. In Thailand's forests, for example, squatters given long-term rights to use their plots care for the land better than squatters with no legal standing, but not as well as those who own their plots outright."

Access to credit, technical advice, the right tools, seeds and other materials can improve agricultural production and protect the environment.

- **In one African country, the International Fund for Agricultural Development (IFAD) has introduced the concept of group lending, using cooperatives of smallholders to improve access to credit and sustainable farming technologies. Women benefit, in particular. Medium-term loans for household water tanks reduce their workload—since women are generally responsible for providing their families with water—and cut down on environmental damage by reducing the pressure on concentrated settlements and water sources.**

- **Credit in the programme is used to promote environmentally sound farming practices, such as crop rotation. Farmers increase their income by cultivating trees which produce gum arabic for sale. Their money-making value discourages use of trees for firewood. The IFAD project includes periodic assessment of its environmental impact through the use of remote sensing.**

Pressure to over-exploit

Developing countries often depend heavily on their natural resources. *Our Common Future* points out that "agriculture, forestry, energy production, and mining generate at least half the gross national product of many developing countries and account for even larger shares of livelihoods and employment". Poorer nations overdraw on their natural resources to generate foreign exchange to pay for imports, finance new ventures and service external debt. They often have no option but to increase production of timber, minerals and agricultural exports beyond sustainable levels.

Burdened by debt, drained by money outflow

External debt, estimated at $1.3 trillion in 1990, drives some developing countries to generate foreign exchange in ways that damage not only their own environment but that of the globe. For instance, a major cause of deforestation has been the clearing of land in developing countries for agriculture and cattle grazing, to earn urgently needed foreign exchange from the export of beef, soybeans, cotton, coffee, timber and other commodities.

- **An estimated 15 million hectares (an area larger than Saudi Arabia) of forestland is lost each year, mainly in Africa, Asia and Latin America. A World Bank forestry adviser has estimated that the**

forest resources of 9 out of 83 developing countries will disappear completely by the year 2000. Thirteen more countries will lose all their forests by the year 2040.

In the 1970s, developing countries imported capital from Western banks, Western Governments and international financial institutions (such as the World Bank). Various factors in the 1980s reversed this situation.

- **Low interest rates in the 1970s had made debt servicing affordable and led developing countries to borrow from commercial banks. In the 1980s, interest rates in industrialized countries sharply increased, raising the cost of Third World debt. Terms of trade deteriorated for developing countries, reducing their ability to service their debt. Commercial bank lending dried up. Many developing countries found themselves unable to cope with the rapid increase in debt-service costs.**

- **Since 1983, the developing countries have transferred to the industrialized countries—mainly through debt servicing—more money than they have received from them. The total outflow was about $180 billion between 1984 and 1989. In 1989 alone, it amounted to $35 billion.**

This financial haemorrhage has deprived developing countries of much-needed funds. It is a major barrier to revitalizing their economic growth, as well as to their joining in international environmental co-operation.

- **In 1989 the UN Secretary-General appointed Italy's former Prime Minister, Bettino Craxi, as his Personal Representative on Debt, and asked him to propose ways to lower the debt burden of indebted countries. After talks with Government leaders and heads of financial institutions and banks, the Representative reported in October 1990 that environmental problems are almost impossible to solve when external debt-service claims a large portion of a country's resources.**

International trade

Primary commodities are the main exports of many developing countries, particularly the least developed. Over the last 10 years, prices of key commodities such as copper, iron ore, sugar, groundnuts, rubber, timber and cotton have fallen significantly. The same is true of the most important primary commodity in international trade—oil. Between 1981 and 1991, the price of oil dropped in both current and real terms.

Protectionism in industrialized countries has increased during this time, hampering the exports of developing countries. Protectionist policies may be costing developing countries' agriculture alone billions of dollars each year in lost income.

- **Thirty million people in developing countries depend on sugar cane for their survival. Sugar production is essential to the economies of some small States like Fiji, Mauritius and several Caribbean islands. But industrialized countries have promoted and protected domestic sugar-beet production, which depends heavily on infusions of capital and chemical herbicides. The 1986 *World Development Report* estimated that in 1983 industrialized countries' sugar policies cost developing countries about $7.4 billion in revenues.**

Handicapped in the international marketplace and unable to obtain more favourable terms of trade, developing countries have been compelled to increase production for export. In the process they may be exhausting irreplaceable resources. The environmental problems of developing countries are woven into international markets, trade patterns and capital flows. Addressing these problems means more than just increased foreign aid. It requires structural changes in the international economy to ease the debt burden of developing countries and improve their terms of trade, and release resources needed to develop environmentally sound economic practices.

A new consensus

International economic relations are marked by tension and uncertainty, but an important degree of convergence and pragmatism can also be detected. This new spirit is expressed in several recent UN documents:

- **"The most important challenge for the 1990s is the revitalization of economic growth and social development in the developing countries", the UN General Assembly stressed at a May 1990 special session on international economic cooperation. The Assembly's unanimously adopted *Declaration on International Economic Cooperation, in particular the Revitalization of Economic Growth and Development of the Developing Countries*, is expected to guide economic policies in both developed and developing countries. The Declaration sets out commitments and policies for all Governments in the areas of debt, development aid, an open trading system, stable commodity markets and the United Nations role in helping revitalize development.**

- **A *Programme of Action* aimed at advancing the world's poorest countries was unanimously adopted in 1990 at the *Second United Nations Conference on the Least Developed Countries (LDCs)*. The Programme offers an approach for donors to increase their official aid to LDCs, stressing bilateral assistance in the form of grants or highly concessional loans, and calls on donors to help reduce LDC debt.**

- **The *International Development Strategy* for the coming decade, adopted unanimously by the Assembly in December 1990, favours a new agenda for international development and government policies which emphasize the importance of international cooperation, greater reliance on market forces, human development, the need to redress glaring inequalities, respect for human rights and preservation of the environment.**

Fueling development

Energy keeps the global economy running. At the same time, it creates major environmental problems. Fossil fuels such as coal, oil and natural gas meet about 85 per cent of global energy demand, but are the principal causes of acid rain and global warming.

The United Nations and energy

The United Nations has convened several international conferences on energy, including new and renewable sources of energy and the peaceful uses of nuclear energy. Organizations and bodies of the UN system pursue research and support projects to develop alternative energy sources and fuel-efficient technology, particularly in developing countries: among them are FAO, the World Bank, UNDP, the Centre for Science and Technology for Development, and the UN Department of Technical Cooperation for Development. The International Atomic Energy Agency (IAEA) is solely devoted to the peaceful development and use of nuclear technology.

- **The UN Institute for Training and Research (UNITAR) encourages energy-resource development. Its *Information Centre on Small Energy Resources*, in Rome, provides information to developing countries on resources particularly useful in rural areas. The *Information Centre for Heavy Crude and Tar Sands* promotes the development and use of heavy crude (a form of oil) and tar sands—energy sources which are plentiful, but not widely developed. The Centre fosters cooperation between developing countries endowed with these resources and countries, organizations and companies that can assist in developing them.**

Acid rain . . .

"Acid rain" is the result of the chemical transformation of sulphur dioxide and nitrogen oxides in the atmosphere. These pollutants are released by such sources as electricity generating plants, mineral smelters, industrial installations, motor vehicles, and residential and commercial establishments using fossil fuels. A variety of approaches and technologies is available to reduce acid rain:

- **producing of fuels low in sulphur and nitrogen content;**
- **using combustion modification technologies and post-combustion emission controls which allow removal of 50 to 90 per cent of the sulphur dioxide in coal-fired electric power plants;**
- **using the catalytic converter to reduce emissions of nitrogen oxides in new cars burning unleaded petrol;**
- **increasing fuel efficiency;**
- **sharing vehicles and limiting private-car use.**

. . . and global warming

As they burn, fossil fuels emit carbon dioxide—the most abundant gas contributing to global warming. About 5.3 billion tons of fossil-fuel-derived carbon dioxide were released into the atmosphere in 1986; 6.8 billion tons are expected to be produced annually by the year 2000. Vigorous measures to reduce carbon-dioxide emissions could limit global warming. These measures include:

- **reducing fossil-fuel use through increases in energy efficiency;**

- **shifting towards natural gas (for the same energy output, natural gas produces only 57 per cent of the amount of carbon dioxide produced by coal);**
- **replacing fossil-fuel use with alternative energy technologies;**
- **eliminating forest loss by better management of forests and large-scale reforestation (forests absorb carbon dioxide).**

Nuclear power

Nuclear energy looked like the best alternative to fossil fuel until accidents at Three Mile Island and Chernobyl and revelations about the spread of radioactivity from military nuclear stations swelled the ranks of those opposed to nuclear power. Higher-than-expected costs and lack of a permanent solution to the problem of nuclear-waste disposal have aggravated uncertainties. As a result, in a few countries nuclear power plants have been shut down, and in others plans for future plants have been scaled down or cancelled.

- **A report prepared by IAEA for UNCED's Preparatory Committee points out that since nuclear power does not produce carbon dioxide, it doesn't contribute to global warming. An increase in its use would therefore slow down the greenhouse effect. And unlike coal, nuclear power does not contribute to acid rain. The main reasons for public objection to nuclear power are concerns about accidents and disposal of radioactive waste. IAEA notes that nuclear fuel generates only small amounts of highly radioactive wastes, making it possible, with currently available technology, to manage safely and dispose of practically all the waste produced. Also in IAEA's view, the risk of accidents should be compared to risks and damage connected with fossil-fuel use. All methods of producing electricity have negative health and environmental consequences, and nuclear power compares favourably with them. IAEA is engaged in efforts to strengthen safety in all nuclear activities, including waste disposal.**
- **About 17 per cent of the world's electricity is generated by nuclear power. Had this electricity been generated by coal, global carbon-dioxide emissions would have been 9 per cent greater, IAEA says.**
- **Renewable commercial sources of energy (hydropower excluded) currently yield less than 0.3 per cent of the world's energy. They are not expected to be capable of producing more than 3 to 5 per cent within the next few decades. In IAEA's view, as efforts to curb carbon-dioxide emissions continue, nuclear power offers a strong option with potential for expansion. Nuclear power may not solve all energy problems, but it is one alternative available to restrain use of fossil fuels.**
- **At the end of 1990, there were 424 nuclear electricity plants world-wide, IAEA reports. Twenty-five countries generate electricity from such plants. Almost half produce more than one third of their electricity by nuclear power. In some countries (such as France) the nuclear share is as high as 70 per cent.**

Discussion within the Brundtland Commission reflected the divided opinions and considerable ambiv 'ence over nuclear power. The Commission concluded that nuclear power generation is justifiable only if solid solutions to its currently unsolved problems are found. Cooperation

among Governments is essential to develop internationally agreed codes of practice, given the potential transboundary effects of nuclear power.

▶ **An International Conference on Nuclear Safety, scheduled for September 1991, is expected to address issues raised in the Brundtland Commission report.**

The "other" energy crisis

Wood is the largest renewable source of energy, accounting for 5 per cent of world energy use. In developing countries, fuelwood accounts for nearly 20 per cent of the energy used. The greatest dependence on fuelwood is in Africa, where it accounts for up to 80 per cent of all the energy consumed.

The world's rural poor depend on fuelwood as their main source of energy. Expanding populations and deforestation have depleted supplies. FAO estimates that 100 million rural people in the developing countries suffer from an acute scarcity of fuelwood. Another billion live in areas where current levels of use cannot be sustained. Severe shortages of fuel seem bound to continue unless new alternative sources of cheap energy are developed and made available on a large scale.

What is in store?

Forecasts of overall energy consumption to the year 2000 suggest an annual increase of 2 to 3 per cent. Fossil fuels will continue to dominate the world energy picture, but their share will decline from 85 to 78 per cent of world commercial energy consumption. The contribution of other renewable energy sources, including hydro-, nuclear and geothermal electricity, is expected to double.

Consumption of fossil fuels is bound to increase, especially in the developing world, although their share of global energy production will decline. Alternative sources (hydropower, wind, solar), better conservation and efficiency do not offer a sufficient substitute, but their share in the energy mix can certainly be increased.

The energy supplies the world economy depends on are in all respects precarious. The crisis in the Persian Gulf region once again demonstrated the oil market's vulnerability. The new, widespread awareness that the use of fossil fuels contributes to global warming has touched a raw nerve in the world economy. Urgent attention must be paid to finding sustainable means for meeting the energy needs of modern societies, and to changing energy-consumption habits, particularly in industrialized countries.

Development goal: a new species of centaur?

The industrialized world and the lifestyles of its inhabitants have often been seen as the model for "development". The private automobile is perhaps one of industrialization's most powerful symbols. It is also one of the greatest threats to the environment. In 1972 *Only One Earth* described man as "a new species of centaur—half-man, half-automobile". The private car has come to represent personal liberty, mobility, sophistication and power. Humanity's love affair

with the automobile is far from over. The global number of motor vehicles—now at about 500 million—is expected to reach 2 billion in the next 20 years, mostly due to demand in developing countries.

- **Road transport and automobiles consume the largest part of the world's oil supplies and are the largest single source of pollutant emissions. In OECD countries, road transport accounts for the lion's share (85 per cent) of total transport fuel use. Use of fuel for transport has almost doubled since 1973 in these countries.**

- **In many developing countries the proportion of older vehicles in use, poor maintenance, lack of spare parts and low fuel quality decrease energy efficiency and make controlling pollution from vehicles more difficult. The emission of greenhouse gases by inefficient vehicles has enormous implications for climate change.**

- **Developing countries in 1988 accounted for under 10 per cent of vehicle production, but this percentage is rising.**

Alternative forms of transport are urgently needed in developing and developed countries. Industrialized countries need to re-examine the predominance of the private car and its effect on urban congestion, air quality and use of resources. But as long as the private car continues to be equated with "success" and "modernity", design of more fuel-efficient vehicles—and transfer to developing countries of appropriate, energy-efficient technologies for transport—will be critical for dealing with problems such as global warming.

The dilemma presented by the automobile illustrates concerns about the direction of development and economic growth; about consumption patterns among the more affluent; about employment, investment and transfer of technology; and about the priorities people set for themselves. As the Brundtland Commission pointed out, sustainable development requires that *"those who are more affluent adopt lifestyles within the planet's ecological means"*. Achievement of such an ideal would mean a fundamental shift in economic behaviour world wide, at all levels.

Meeting environmental costs will have repercussions throughout the economy. Efforts will have to be made to ensure that those who benefit now from unsustainable past practices contribute appropriately to resolving the difficulties they have created. At the same time, individuals and societies as a whole will have to reorient the nature and pattern of their consumption to take into account environmental needs.

Accounting for the environment

The wealth of nations is usually measured by standards such as gross domestic product (GDP). But a growing number of economists at the United Nations and around the world say such standards fail to give a true picture. By ignoring or disguising environmental costs of economic activity, and counting as growth expenses to preserve or restore nature, the GDP of many countries has often been inflated or distorted. Environmental economists are developing methods of environmental accounting to reflect the true costs of resource use (and abuse) in national accounts.

- **The UN Statistical Office is in the forefront of this effort. In collaboration with the World Bank and UNEP, the Statistical Office is preparing a general framework for environment and natural resources accounting, and guidelines for countries that want to draw up their own "green" GDP.**

These methods take into account the effects of population growth and the condition of critical resources such as land, water, forests, wildlife and mineral reserves. Environmental accounting would radically change our conception of economic growth and serve as a valuable tool in integrating environmental concerns and economic policies—a necessary process if the world is to move towards sustainability.

- **The *World Resources Institute* has provided a concrete example of this approach by reviewing the economic performance of Indonesia.* The country's economic performance between 1971 and 1984 was successful by traditional measures: its GDP increased on the average of 7.1 per cent a year. But when depletion of three key natural resources—forests, oil and soil—was taken into account, the revised domestic product showed an increase of only 4 per cent a year. Even this figure could be considered too high, because the depletion of many other resources was not accounted for.**

- **Among the countries taking steps towards environmental accounting: Germany is working out a system to correct its national bookkeeping. France and Norway have started to compile inventories of their natural resources—a first step towards linking the state of the environment to economic activity. The Netherlands is working on a system to reflect in its national accounts environmental damage and the cost of maintaining or restoring the environment.**

What role for Governments?

Including environmental considerations in national accounts has far-reaching implications: new economic incentives may be developed, taxation systems changed, and consumption patterns and lifestyles re-evaluated with an eye to the health of the environment. Governments will have to promote optimal long-term use of the environment. Taxes or fees, bans on certain materials and processes, and enforcement of environmental standards are among the measures available. Governments can, for instance, discourage wasteful use of water and electricity by raising their price, either directly or through taxes. They can discourage inefficient or damaging use of fertilizer and pesticides by revising or reducing agricultural subsidies. New tax regimes on forest industries could encourage replanting and lead international prices to reflect better the environmental value of trees.

- **A variety of environmental taxes have been introduced by Western European countries in recent years. An 8 per cent tax on leaded petrol, introduced in Britain in 1989, led to an increase in the market share of unleaded petrol from 4 to 30 per cent in one year.**

- **Stringent standards brought about a dramatic improvement in environmental pollution in Japan. In the 1960s, Japan's imported oil would have produced some 6 million tons of sulphuric acid when**

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* Cited in *Development*, "Counting the cost of sustainability", 1989, vol. 2/3.

burned. Technology for de-sulphuring crude oil at the refinery and tight regulations reduced sulphur-dioxide emissions to less than one tenth the amount of sulphur contained in crude oil imports. Despite economic growth and higher fuel consumption, ground-level concentration of the pollutant in the mid-1980s was below pre-1960 levels. Energy efficiency regulations and pricing policies have also benefited Japan in the world marketplace.

- **The United States introduced in 1989 a tax on ozone-damaging chlorofluorocarbons (CPCs) to hasten their phase-out. The tax is expected to generate $4.3 billion in revenues over five years.**

The price of conservation

New pricing policies may be the most direct means of ensuring that the full environmental costs of goods and services are accounted for. Prices have not usually reflected the environmental costs of producing, extracting and replacing them, or the environmental costs of their use and disposal. Society as a whole has generally borne these costs. Pricing mechanisms (including taxes and subsidies) can exact from companies and individual consumers their share of the social costs of their actions. The *UN Centre on Transnational Corporations* has pointed out that more accurate costing would raise the price of products and services which damage the environment and reduce their consumption. Truer pricing would also encourage industry and consumers to employ low- and non-waste technologies, reuse and recycle materials, enhance energy efficiency and improve product durability.

- ***UNEP's Office for Industry and Environment* has fostered contact between developing and industrialized countries on issues such as prevention of chemical accidents, disposal of industrial wastes and management of wastes from paper-producing industries. The UN Industrial Development Organization (UNIDO), the International Labour Organisation (ILO), IAEA and other UN-system organizations provide developing countries with training, technical assistance and information to improve their ability to deal with the environmental aspects of industrial development.**

Good ecology is good economics

Concern over the environment has spurred industry to develop new products and more efficient processes, and reduce costs. "Experience in the industrialized nations has proved that anti-pollution technology. . . has made many industries more profitable by making them more resource-efficient", says the Brundtland Commission report. "While economic growth has continued, the consumption of raw materials has held steady or even declined, and new technologies offer further efficiency."

- **Participants at the *first World Industry Conference on Environmental Management (WICEM)*, convened by UNEP and the *International Chamber of Commerce (ICC)* in 1984, constantly reiterated that industries that curb pollution through recycling and applying low- and non-waste technologies were often more profitable than competitors using older, more polluting technology.**

- **France's chemical industry has halved pollution levels over the past 10 years while increasing production by 25 per cent. Japan has reduced the energy required to produce a unit of GDP by some 40 per cent since 1975, while effecting a similar reduction of the raw materials component.**

Most industries are now convinced that it pays to prevent pollution rather than clean it up, and that concern for the environment leads to financial savings and increased competitiveness. Attention has switched from pollution control to pollution prevention: from cleaning up the mess "at the end of the pipe" to making sure that what goes into the pipe is clean in the first place.

- **UNEP and ILO have launched a programme aimed at encouraging institutions to include environmental management along with courses in business education and management training. At the 1984 WICEM meeting, UNIDO's Deputy Director-General stressed that environmental protection "is no more an issue of ethics, but one that is linked to the survival and growth of the enterprise".**

The environment needs business

ILO points out that employers and their organizations provide the basis for economic growth, which is essential to finance new investments in environmental protection. Companies are also the most important source for the development of clean, low-waste and energy-efficient technologies.

- **The chemical industry that produces CFCs participated in all the negotiations over the amended Montreal Protocol. The industry's support for the Protocol was crucial to its success. "Without their full co-operation at the outset—at the time of negotiating the treaty in 1986 and 1987—a treaty would still be a distant goal", says UNEP Executive Director Mostafa Tolba.**

Corporate environmentalism

Each year more companies adopt policies which involve major investment in pollution-abatement equipment and the integration of new, clean technologies and processes.

- **Bayer, a German-based chemical group, spends 20 per cent of its manufacturing costs on environmental protection. Chevron, a United States-based oil company, expects its environmental spending to grow by 10 per cent a year. *A sense of "corporate environmentalism"—recognition that attention to environmental issues is now essential for business success—is evolving. Enterprises are influenced by a variety of factors, including*:**
- **rapid extension of environmental laws, standards and guidelines;**
- **fear of economic constraints, which has motivated companies to take voluntary action to remedy environmental problems even before laws are passed;**
- **growing public support for environmental protection and evidence that consumers' choices can be affected by their perceptions of an enterprise's environmental practices;**
- **emergence of new business opportunities, such as "green" products;**
- **risk of sky-rocketing insurance costs and potentially costly liability claims;**
- **recognition that all these factors can influence competitiveness.**

The environment is good business

A dynamic, high-growth—and high-profit—business sector is taking shape: the environmental sector. It is responsible for up to 3 per cent of total gross national product (GNP) in many industrialized countries and employs millions. Companies involved in eco-business are expanding, and new ones are being established. Environmental investment funds and equity financing are growing.

- **In Western Europe alone, the eco-market's 1989 volume was estimated at $90 billion; by the year 2000 it is expected to reach $174 billion.**

- **In the United States, the environmental engineering and consulting business has been growing by 20 to 30 per cent a year, according to one estimate, and is attracting foreign investors. Pollution abatement and control was a $98 billion industry in the United States in 1988 and reportedly generates nearly 3 million jobs. The Office of Technology Assessment, an arm of the United States Congress, estimated in 1989 the cost of cleaning up the sites of the worst environmental damage at $500 billion—much of which will be paid to private contractors—over the next 50 years.***

Encouraging signs

As they pursue economic growth, developing countries will add immensely to global environmental pressures and risks, unless they can make the transition to more sustainable development. They cannot afford to do this without additional financial resources and the technologies needed to integrate environmental considerations in their development.

People in the industrialized countries, their Governments and enterprises need to recognize that it is in their own self-interest to help developing countries achieve environmentally sustainable growth. Business as usual is not sufficient. The British publication *The Economist* commented in 1987 that

- **"...some big environmental headaches are beyond the ken of markets. Market forces encourage the destruction of the complicated ecology of the jungle, because at present the only way to make money from the trees of a tropical rain forest is to cut them down and invest the proceeds...To preserve the rain forests, therefore, the rich countries should put up or shut up; let them pay the poor countries not to cut down their trees."****

There are encouraging signs of such interest:

- **Meeting in London in June 1990, industrial nations agreed to a UNEP proposal for an international *ozone defence fund* with a three-year (1991-1993) budget of $160 million. The fund, managed by the World Bank, will help convert factories in developing countries that produce ozone-damaging substances to more ozone-friendly chemicals. The fund represents the first time industrialized countries have offered cash to developing countries to help meet environmental goals.**

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* Bruce Stutz, "Cleaning Up", *The Atlantic Monthly*, October 1990.

** *The Economist*, "Making Sense of Brundtland", 2 May 1987.

- **Some 19 industrial countries have pledged funds to the new *Global Environmental Facility* set up by the World Bank, UNDP and UNEP. Grants from the fund support projects in developing countries to fight loss of biodiversity, global warming, degradation of water resources and ozone-layer depletion. This three-year pilot project is endowed with about $1 billion.**

- **Largely thanks to a $16 million grant from Japan, in 1989 the World Bank created a *Technical Assistance Grant Programme for the Environment* to help finance the Bank's environmental projects.**

- **In 1987, *Conservation International*, a U.S.-based non-governmental organization, bought $650,000 of Bolivia's commercial debt at an 85 per cent discount, and cancelled it in exchange for a promise from the Bolivian Government to finance and expand a national nature reserve. Since then, *"debt-for-nature swaps"* have been completed involving several countries, including Costa Rica, Ecuador, Madagascar, the Philippines, Poland and Zambia. Most of these arrangements have been concluded by voluntary organizations, but the Dutch, German, Swedish and United States Governments have also been involved.**

A question of will

"The main difficulties in dealing with the environment are not technical, but political, economic and social", says Michel Hansenne, Director-General of the International Labour Office. "The problems lie in the lack of political will; the lack of adequate financial resources or unwillingness to devote adequate financial resources; and the conflicts within our societies which prevent us from reaching consensus on what to do, how to do it and how to pay for it." If these obstacles are overcome, the resources and the technology to protect the environment are there for us to use.

SCIENCE AND TECHNOLOGY: DOUBLE-EDGED SWORDS

UNITED NATIONS

''Selecting a technology for a specific job is a very different matter from importing the whole, lock, stock and barrel. Developing an alternative does not mean turning one's back on progress. Borrowing from the past does not imply evolutionary regression. . .There is a desperate need for more appropriate forms of technology than now exist—both in the developing world and in the industrialized regions. But, even more than that, we need to learn to mix technologies, to select, to adapt, to improve—blending some of what is traditional with some of what is modern with some of what is appropriate.''

András Biró, Editor, *Mazingira*, 1978

''It is ironic to think that man might determine his future by something so seemingly trivial as the choice of an insect spray.''

Rachel Carson, quoted in *Design for a Livable Planet**

In the delegates' area at UN headquarters an ancient mosaic, a gift from Tunisia, depicts the four seasons as human figures. To the artist who designed this object in the 3rd century, man and nature were one. Early Western calendars personified the seasons until about the middle of the 9th century in Europe, when they began to show men actively transforming nature. They plow, harvest, chop trees, hunt game and butcher pigs. Man became nature's master.

New technologies have always altered human behaviour and the relationship between human beings and their environment. By the middle of the 19th century the scientific and industrial

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* *Design for a Livable Planet*. Jon Naar, Ed. Harper and Row. 1990.

revolutions spread the chiefly Western idea that scientific knowledge translates into technology for exploiting and controlling nature.

It's not easy to be green

Science and technology are double-edged swords, "developmental driving forces", that cut across all aspects of environment and development, often with unintended and unpredictable consequences. Modern industrial agriculture's reliance on fossil-fuel energy, man-made pesticides and monocultures of genetic hybrids have all contributed to economic growth at the risk of ecological loss. Apparently simple technological answers to problems of industrial pollution, like the "tall smokestack" strategy of waste dispersal, were based on the illusion that if pollution is spread thinly enough, it will go unnoticed by people or by nature. This simple "solution" led to the problem of acid rain.

Developing countries have adopted many technologies and processes with encouragement from industrialized countries. As a consequence, developing countries suffer a double dose of environmental problems: the often harmful side-effects of industrialization and the environmental stresses of underdevelopment.

A few issues in energy, industry and agriculture illustrate the complexity and importance of science and technology in the debate over sustainable development.

Sweden's hard choices

- **Over a decade ago, Sweden decided to preserve its four remaining large northern rivers rather than develop them for hydroelectric power. Nuclear power had been developed as an alternative to dams which can displace communities and immediately affect wide areas. The nuclear accident at Three Mile Island in the United States began a strong shift in public opinion against nuclear energy. As the result of a referendum in 1980, the Swedish Parliament decided to phase out nuclear power completely by 2010. This decision was strengthened after the accident at Chernobyl, Ukrainian SSR.**

- **Nuclear power plants produce 50 per cent of Sweden's electricity. In January 1991 agreement was reached in the country to develop alternative, renewable sources of energy to replace nuclear power generation. Responding to international concern over global warming, the Swedish Government has also committed itself to stabilizing emissions of greenhouse gases such as carbon dioxide at current levels by the year 2000. The real price of electricity is expected to soar. Political debate over the feasibility of the carbon dioxide ceiling has already begun. Other energy options, like increasing the amount of electricity generated from biomass, are being considered. Price supports for farmers are drawn into the debate: if price supports are eliminated, payments to farmers for environmentally friendly production might be used to encourage farmers to cultivate biomass for power generation.**

Many people are particularly concerned about nuclear waste disposal. Even without further conversion to nuclear power, 200,000 tons of spent nuclear fuel will have accumulated by the year 2000. Safe disposal of such waste is technically feasible, but no permanent disposal facilities are likely to be in operation by then. Apart from disposal of radioactive waste, the environ-

mental impact of nuclear accidents or the extent of diversion of nuclear materials to non-peaceful uses are impossible to project. Nuclear technology has revolutionized our lives in medicine, water and soil evaluation, mineral exploration, plant breeding and genetics—to name just a few applications. But controversy persists over nuclear power generation and its potential for environmental damage. Discussion within the Brundtland Commission reflected three main tendencies among Governments:

- **to remain non-nuclear and develop other energy sources;**
- **to regard their present nuclear power capacity as necessary during a finite period of transition to safer, alternative energy sources;**
- **to adopt and develop nuclear energy with the conviction that the associated problems and risks can and must be solved within a level of safety that is both nationally and internationally acceptable.**

The Brundtland Commission concluded that nuclear power generation is justifiable only if there are solid solutions to its presently unsolved problems. Cooperation among Governments is essential to develop internationally agreed codes of nuclear power practice, given its potential transboundary effects.

- **IAEA has developed safety standards and guidelines for planning, siting and operating nuclear power plants, and cooperates closely with WHO and ILO on programmes to enhance the safe use of nuclear technology. It has been instrumental in developing emergency procedures and agreements for action in response to nuclear accidents. An international conference on nuclear safety, scheduled for September 1991, is expected to address issues raised in the Brundtland Commission report.**

Energy efficiency: a matter of technology

Increased energy efficiency, development of new and renewable sources of energy and "low energy path" alternatives will be essential to achieve a transition to sustainable development in industrialized and developing countries alike. A change in lifestyles and attitudes towards energy consumption by the more affluent people, along with better production processes, will contribute to energy conservation.

- **Energy efficiency is important everywhere. The cement factories, automobiles or irrigation pumps in a poor country are fundamentally no different from their counterparts in the rich world. In both, there is roughly the same scope for reducing energy consumption or peak power demand of these devices without loss of output or benefit to their users.**
- **The woman who cooks in an open earthen pot over an open fire uses perhaps eight times more energy than an affluent neighbour with a gas stove and aluminium pans. The poor who light their homes with a wick dipped in a jar of kerosene get one fiftieth the illumination of a 100-watt electric lightbulb, but use just as much energy. For the poor, the shortage of money is a greater limitation than the shortage of energy. They are forced to use "free" fuels and inefficient equipment because they do not have the cash to purchase energy-efficient fuels and devices.**

Industry: manufactured goods and ills

Carbon dioxide, carbon monoxide, methane, sulphur dioxide, nitrogen oxide . . . all are well-known polluting gases. CFCs or chlorofluorocarbons, compounds first developed in the 1930s, gained a reputation as the chemists' dream but became a nightmare 40 years later. They are widely used in refrigeration, packaging, cleaning of electronics and other processes. The inventor of CFCs could hardly have known that his discovery would damage the ozone layer. Once released in the stratosphere, CFCs split apart and destroy ozone molecules. By eating away at the earth's protective ozone shield, they threaten humans with increased incidence of skin cancer and other illnesses, as well as damage to plant and animal life.

- **The United Nations played an important role in raising the alarm about CFCs, and in achieving international agreements to phase out their use. UNEP convened a panel of experts in 1977 to hear evidence presented by scientists concerned about CFCs and maintained international focus on the issue until the Vienna treaty on the ozone layer and the later Montreal Protocol were concluded. Scientific evidence of the damage caused by CFCs, coupled with the prospect of international and national regulation to limit—and ultimately eliminate—their use, has spurred industry efforts to find alternatives.**

- **Ensuring developing countries access to this new technology is a crucial part of the effort to save the ozone layer. Refrigerators to preserve food or vaccines are as valuable to the three quarters of the world's population living in developing countries as they are to the more industrialized countries—although they are far more scarce. The ozone layer shelters industrialized and developing countries alike, and data released in the second quarter of 1991 indicate that it has suffered more extensive damage than previously thought.**

From "polluter pays" to "pollution prevention pays"

CFCs illustrate the need to develop alternatives when technology presents unexpected hazards to the environment. Industrial waste, often toxic, presents a similar need for alternative processes and products. Waste is an economic and ecological loss. Efficiency translates into profit; cleaning up pollution adds to costs. This is particularly true of hazardous wastes.

- **Although definitions vary, in 1984 an estimated 325 million to 375 million tons of hazardous waste were generated world-wide. Industrialized countries accounted for about 90 per cent of the total. Disposal is expensive. The Brundtland Commission noted that the price of hazardous-waste disposal in OECD countries alone ranged from $60 million for Denmark to between $20 billion and $100 billion for the United States.**

The emphasis in pollution control has shifted from cleaning up waste after production to minimizing waste by using cleaner, safer and more resource-conserving technologies. Fine ceramics, rare metals and metal alloys, and high-performance plastics are among the new materials industry uses to conserve energy and resources. Companies are increasing their efforts to recycle toxic components back into the production system.

- **In Sweden, pharmaceutical-maker Astra substitutes water for some solvents and has cut toxic wastes by half.**

- **At a pesticide plant in Colombia, Du Pont, a major transnational corporation, has introduced new equipment which recovers chemicals used in making fungicides. Waste discharges have been cut by an estimated 95% per cent.**

- **The French Government provides matching funds for companies researching waste-minimizing technologies.**

Many developing countries still depend heavily on their exports of minerals and other commodities, mostly unprocessed or partially processed. Access to energy- and resource-efficient technology, training and investment will be needed as they become more involved in processing raw materials, and their manufacturing industries grow.

Developing countries do not have the resources to industrialize now and repair the damage later; nor will they have the time, given the rapid pace of technological progress. They—and the environment—can benefit from improvements in resource and waste management in industrialized countries, and avoid the earlier mistakes of the developed world. Imported industrial technology has benefited many developing countries when it has been accompanied by training in maintenance and operation for local people, along with financial and institutional support.

Recycling is another approach to waste disposal. Changing "throwaway" societies to "conserving and recycling" societies holds promise for the future.

- **Japan converts more than 100,000 tons of garbage into valuable material every year. Recycling has become a way of life. In some developing countries recycling has developed out of necessity. Garbage collection itself is often a problem and waste disposal prohibitively expensive. Developing country-based industries frequently depend on recycled materials because raw materials are expensive or scarce.**

What you don't know can hurt you

The director of *UNEP's International Register of Potentially Toxic Chemicals* (IRPTC) has said: "There are no safe chemicals; there are only safe ways of manufacturing, handling and using them."

- **If we were to begin listing chemicals we would run out of room. Of some 7 million chemicals that have been identified, roughly 80,000 are in common use.**

A particularly troubling aspect of waste disposal is the international trade in hazardous wastes. Roughly 10 to 20 per cent of all manufactured waste is potentially hazardous. Cyanide and paint residues, wastes from metal refining, solvents, oily wastes and material containing arsenic, asbestos, mercury and cadmium are only a few of the dangerous materials commonly found in industrial and consumer waste.

Most industrialized countries now regulate toxic waste disposal. In some instances, industries have shifted plants to countries where laws are less stringent, or export their toxic waste. Developing countries face enormous difficulties in managing hazardous waste—whether it is produced domestically or imported. IRPTC has made its expertise available in a number of cases when toxic spills occurred.

- **The IRPTC helps potential users of chemicals assess the suitability of chemical products in international commerce. It compiles and disseminates information on internationally traded chemicals that may pose a danger to workers and the population at large. The IRPTC network of 117 national correspondents, including government agencies, research institutes, international organizations and industries, provides information on the chemical make-up of products and their degree of toxicity, use, storage and disposal as well as on national regulations.**

- **When a barge carrying containers of cyanide collapsed in the Fly River, Papua New Guinea, IRPTC rapidly provided information on its toxicity, its lifetime in an aquatic environment, the dangers of consuming contaminated fish, and appropriate treatment in the event of poisoning.**

The United Nations has promoted international cooperation to minimize the risks of hazardous-waste transport and disposal. The most recent milestone is the conclusion of the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal*. Pending its entry into force, many countries have agreed to notify others when they ban or severely restrict the use of a chemical. Other UN-system organizations, including FAO, ILO, WHO and IAEA, promote exchange of information and expertise to ensure safe use and handling of chemicals and other hazardous materials.

Planning ahead

Prompt response and sharing of information are useful, especially to developing countries that lack the scientific and technological tools to cope with environmental disasters. But environmental impact-assessment and risk evaluation, and assessment of technological needs *before* new technologies, products and wastes are introduced into a country, are invaluable.

- ***UNEP's Office for Industry and Environment* is creating an information network on low- and non-waste technologies and has prepared voluntary guidelines on industry-community cooperation to reduce the frequency and severity of industrial accidents. The Office cooperates with trade associations in the aluminium, iron and steel and petroleum industries to make available technical information on environmental management in those industries. Proposals for a directory of hazardous technologies—and safer, cleaner alternatives—are under discussion in the United Nation's *Commission on Transnational Corporations*.**

- ***UNIDO*'s environmental programme emphasizes pollution prevention and environmentally sound engineering for industry in developing countries. UNIDO helps developing countries: acquire expertise in environmentally sound management, pollution control and abatement; formulate industry-related environmental laws and standards; and obtain clean, low-waste, energy-efficient technologies. Its 75 environment-related projects in 1990 included pollution control in leather tanning,**

re-refining of used lubricating oil, purification of industrial waste-water and a pilot project for recycling plastics.

The UN *Centre for Science and Technology for Development* operates the *Advanced Technology Assessment System*, which includes workshops and seminars—involving policy makers, scientists, engineers, entrepreneurs, union leaders, manufacturers and consumers—to enhance developing countries' capacity to assess new and environmentally sound technologies. Among these activities:

- **an international conference to be held in China in 1991 on the reduction of carbon dioxide emissions using clean coal technology;**
- **a workshop on solar energy technology in Sao Paulo, Brazil, in 1991;**
- **a regional meeting in Dakar, Senegal, in October 1990 to examine the potential of biotechnology for food production in drought-stricken areas of Africa;**
- **a *Technology Assessment Network* which links research institutions and builds on their experience and resources to support planning relating to science and technology in developing countries.**

Agriculture

New techniques, the introduction of inorganic fertilizers and pesticides, and development of high-yield varieties of grains and other food crops have revolutionized agriculture. High yields have meant enormous surpluses in certain countries and self-sufficiency in food production for countries which previously relied heavily on imported food. Use of DDT and other inorganic pesticides grew rapidly after the Second World War, helping in the "green revolution". Despite their relatively low financial cost and initial success at improving crop yields, it became apparent that these pesticides carried unanticipated social and environmental costs. Pesticide residues can contaminate drinking water, affecting the health of entire communities. Improper use can gravely affect the health of farm-workers. Chemical pesticides can also cause unemployment by substituting for more labour-intensive pest control measures.

- **Developing countries account for only 15 per cent of global pesticide use, but their consumption is increasing. They also account for some 375,000 cases of accidental poisoning from pesticides annually: over half the world's total.**
- **Ten thousand of these cases result in death. Misuse presents particular dangers: a poison imported to kill rats in sugar plantations in Guyana was mistaken for fertilizer and ended up in the food chain, contaminating milk and grain. Case-studies in the Philippines have shown a correlation between the rise in pesticide purchases and an increase in deaths of agricultural workers, many of whom were not wearing protective clothing when applying the chemicals.**

Repeated use or misuse of pesticides can also be counter-productive. Concentrations in the soil can impair its capacity for regeneration during fallow periods. Targeted insects and other pests may develop resistance to chemicals. In some areas where DDT has been used in malaria control, mosquitos have developed resistance and returned.

In South and South-East Asia, intensive cultivation of single crops instead of multi-crop cultivation has had negative effects on soil fertility, biodiversity and dietary patterns, and has presented farmers with new pest control problems. FAO's *Integrated Pest Control Programme* in the region found that some problems result directly from insecticide use.

- **Pesticides have upset the ecological balance between pests and predators which has evolved over thousands of years of rice farming in parts of Asia. Dramatic evidence of this was recorded in Indonesia where an insect, the brown planthopper, infested rice crops in Java and Sumatra in 1976-77. In an attempt to control the infestation, more than a million rice fields were blanketed with pesticides.**

- **As a result, the insect's natural enemies were killed off, leaving the planthopper to devastate 500,000 hectares. The rice lost could have fed 3 million people for a year.**

Integrated crop and pest management has gained broad scientific recognition in the past two decades and has proved a successful and appropriate alternative to pesticide use in Asia.

Biological pesticides: technology goes back to nature

For centuries India's people have known that placing the fruit of the "neem" tree in clothes and granaries wards off unwanted insects. Scientists looked into this traditional remedy and found a natural insecticide in the tree's seeds.

- **A firm in Salt Lake City, Utah, has modified the naturally occurring insect repellant in the neem tree to produce a more stable derivative which is biodegradable and not toxic to people. When sprayed on cotton plants, it prevents insects from moulting and kills any insect that ingests it.**

Biological pesticides have at least two advantages over synthetic treatments: they have evolved naturally over time, offering a potency that is hard to duplicate; and they tend to have fewer negative side effects than synthetics.

- **WHO supports research on biological techniques to control diseases such as malaria. A bacterium known as "*Bti*" has been found to kill the larvae of malaria-carrying mosquitos and a species of fly which spreads "river blindness". *Bti* may offer an alternative to chemical insecticides such as DDT. Since resistance is growing among disease-carrying insects, WHO's search for biological means of disease control has been boosted by this discovery.**

- **WHO has approached UNIDO and UNEP to explore cottage-industry-scale production of *Bti*. Development of biological pesticides is already advanced in countries like China and India, offering possibilities for technical co-operation among developing countries.**

Biotechnology: no such thing as a home-grown meal?

- **Tomatoes carry genes from Central America, cucumber germ-plasm originated in Burma, the carrot and onion were first domesticated in Central Asia, potatoes come from the Andes and most cereals were first cultivated in the Near East and China. The "home-grown" meal does not exist. "Now**

the North is selling back 'modern' varieties of these same crops and the genetic security of the world's food supply is about to disappear.''

This is the central message of a story appearing in the journal *Development Dialogue*.* Biotechnology, the use of the natural and engineering sciences to modify living organisms and their parts to create new products and processes, has been variously welcomed as a panacea and rejected as a threat to development. Genetic modification makes it possible to speed up the natural processes of animal and plant breeding, transform the quality and supply of food and revolutionize the development of pharmaceuticals. It has produced new plants and crop varieties, new processes for waste treatment and other applications.

Biotechnology raises difficult ethical and legal questions as well as new productive possibilities. Most biotechnology is in the hands of a few major venture-capital firms and funded by transnational corporations involved in sectors such as pharmaceuticals and food and beverage industries.

Biotechnology's potentially adverse effects, particularly on developing countries, must also be acknowledged. Products of biotechnology may reduce the demand for agricultural commodities from developing countries. Farmers may become more dependent on complete packages of seeds and expensive fertilizers and pesticides. Valuable knowledge may be privatized or protected, creating barriers to developing-country access to new technologies. Licensing of patents and payment of royalties for end-products—which may even utilize germ-plasm from developing countries—can drain already-meagre foreign exchange. Genetically engineered plant varieties may carry the seeds of their own destruction by threatening biodiversity—the gene ''warehouse'' on which all such developments depend.

▶ **Over the last half century India has grown some 30,000 varieties of rice. In the early 1980s the Indian Agricultural Research Institute predicted that just 50 varieties would be in use by the turn of the century, and that 10 would occupy 75 per cent of the land. Not only would some species be wiped out, but natural resistance to certain diseases might also disappear.**

Biotechnological products can result in unemployment, as substitutes are created. Commercial use of artificial sweeteners has already begun to affect the economies of major sugar producers:

▶ **Coca-Cola and Pepsi-Cola use massive quantities of sugar in the United States. Between 1980 and 1984, they switched to high-fructose corn syrup as a sweetener, thanks to biotechnology. Other soft-drink manufacturers are following suit and many have turned to Aspartame, a sweetener made with the aid of biotechnology, which is 200 times sweeter than sugar. Industrialized countries that imported large quantities of sugar from the developing world now have a lab-grown alternative.**

Discoveries in biotechnology and genetic engineering could benefit development. Efforts are being made to expand the biotechnology capabilities of developing countries in ways relevant to local needs and conditions.

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* *Development Dialogue*, 1983: 1-2. Dag Hammarskjöld Foundation, Uppsala, Sweden.

- **Under the auspices of UNIDO, two branches of the *International Centre for Genetic Engineering and Biotechnology* are being set up, one in Trieste (Italy) and the other in New Delhi (India). The Centres will conduct research, train scientists from developing countries and offer developing countries access to biotechnology. In India the Centre will focus on human health and fertility, animal health and agriculture, while the Centre in Italy intends to concentrate on energy, industrial technology and pollution abatement.**

- **A joint FAO/WHO consultation on biotechnology and food safety held in Geneva in November 1990 attempted to develop guidelines for evaluating food safety every time the food-making or -growing process is changed or new techniques are introduced as a result of biotechnology. The participants called for consumers to be given sound, scientifically based information which explains the application of biotechnology and clarifies its safety aspects.**

Transfer of technology

The Montreal Protocol to protect the ozone layer came into force on 1 January 1989. A UN system fund will help developing countries obtain technology needed to phase out CFCs by the end of the century. The fund is an important step, but how the technology is to be made available to developing countries remains to be worked out. Private patent-holders of technologies guard their intellectual property rights carefully.

- **Industries that invest heavily in research and development of new products and compete fiercely in the international marketplace approach transfer of technology with considerable caution. None the less, a dozen North American-based corporations have established the *Industry Cooperative for Ozone Layer Protection*, a business initiative inspired by the Montreal Protocol. The group operates *OZONET*, a globally accessible database which provides information on alternative processes and technologies to those using CFCs. Experts from the companies are working on appropriate alternative technologies for developing countries.**

Guidelines to facilitate transfer of technology are needed in many areas. Where technology is crucial for preserving the global environment, the common interest in facilitating technology transfer is obvious. A meeting of the minds among Governments and private industry, the scientific community and enterprises in the North and the South is critical to ensure that technology for the common good is made available on terms acceptable to all. The United Nations has taken some steps towards this goal.

- **In 1974, the General Assembly first called for a code of conduct on the transfer of technology, taking into account the circumstances of developing countries. The *UN Conference on Trade and Development (UNCTAD)* took on responsibility for drafting the code, which is still being negotiated. An UNCTAD study notes that in fields such as informatics, telecommunications and biotechnology, important scientific and technological discoveries have been made in the developed market-economy countries, widening the technology gap.**

▶ **Collaboration within private industry in the North has made it more difficult for outsiders, mostly in developing countries, to acquire new technology on acceptable terms.**

Cooperating for a brain gain

A good contract in legal and financial terms does not always pave a smooth way for the transfer and assimilation of technology. Developing countries have learned to bargain better and they know more about their own requirements. Concerns about environmental health and safety impacts of technology have led developing-country negotiators to seek advisory services when importing new technologies. Joint ventures and collaborative arrangements have brought benefits to developing countries where a balanced relationship between technology supplier and recipient has been achieved.

▶ **The *Industry Agenda for Action* presented at a meeting of industry executives from the *UN Economic Commission for Europe (ECE)* region held in Bergen, Norway, in 1990, was an encouraging development. The participants urged world-wide support for the *Environmental Guidelines for World Industry* prepared by the *International Chamber of Commerce*. These apply to industry in developing countries as well as in industrialized nations, and cover private and State-owned enterprises. Participants in the Bergen meeting said that the transfer of environmentally sound technologies presented a major opportunity for improving the environment. International organizations and industry were asked to explore funding mechanisms and incentives to make these technologies available to users unable to pay for them. Thirty corporations are already members of the *International Environmental Bureau* set up after the first *World Industry Conference on Environmental Management* in 1984. They have agreed to make their technology and know-how available to other companies. The second WICEM, in Rotterdam, Netherlands, in April 1991, addressed issues relating to property rights and patents.**

The *UN Centre on Transnational Corporations* describes sustainability as "living off nature's 'income' and not dissipating its 'capital' ". Transnational corporations are already engaged in research and development of clean technologies. They will continue to occupy a dominant place in the search for and production of technological breakthroughs and adaptations. They can be instrumental in making available to developing countries technology that is suited to the environment and development needs. But concrete guidelines for sustainable development are needed to help decision makers at all levels of government and industry.

Speaking to a meeting convened by ICC in 1990, UNCED Secretary-General Maurice Strong emphasized industry's importance in translating scientific and technological advances into products which benefit society. Environmentally sustainable development will require industry's active participation:

▶ **"Industry is the principal instrument of economic growth; it is also the prime instrument of environmental and social change. It is largely through industry that the benefits of technological change are made available to society and it is through industry, too, that the negative consequences of these changes have been largely produced. Industry offers the principal means of making the transition**

to the sustainable society. But it can only be expected to do this if Governments provide the fiscal and regulatory conditions which give industry the incentive to adopt environmentally sound practices and processes and produce the products and services that foster sustainability.

Technology for whom, where?

In the words of a European Community official, "We can never produce enough specialists to adapt technologies to each place." Given the problems of technology transfer, developing countries must be highly selective and import technology which enhances domestic capabilities.

- **Anil Agarwal, Director of New Delhi's Centre for Science and Environment, has pointed out that most of the world's people live off the land in a subsistence economy. Fundamental needs like food, fuels, building materials, fertilizers, bamboos and various types of grasses for traditional crafts are collected from the immediate environment. The GNP which matters to them most is what he calls the "gross *nature* product". In his view, Governments and industry must recognize the conflict between the growth of gross *national* product and maintenance of the gross *nature* product.**

People must be involved in the search for technologies that meet their immediate needs. Suitable indigenous technologies and home-grown assessments of technological needs are needed in the search for environmentally sound technology, especially in developing countries. Co-operation between developing countries can be especially fruitful.

- **The Ethiopian "*ard*" plough lifts and breaks the soil, as it was meant to do, since inverting the soil would increase the risk of erosion. Its unique design allows for the least amount of rainwater run-off from tilled soil. Attempts to introduce ploughs of foreign origin in Ethiopia have disregarded the fact that resource-conservation was at the heart of a design perfected by the local communities over the centuries. Six years of research at the Ethiopian Institute of Agricultural Research produced a new plough which allows early planting and reduces soil erosion. Although "home-grown" for use in Ethiopia, researchers from India and Thailand worked with colleagues from Africa on this innovation.**

- **Chile has begun to substitute an indigenous bean, *lupino*, for soybean, a major food source. Cultivated for centuries as a food, lupino has more recently been used. Like other legumes, lupino has the advantage of acting as a fertilizer when grown together with wheat and other cereals.**

- **The *jojoba* plant, which grows wild in the south-western United States and in Mexico, may help save the sperm whale from extinction. A jojoba extract can substitute for sperm-whale oil, a highly prized and rare commodity widely used in manufacturing.**

When crying over deforestation, how about using fewer paper tissues?

Technology alone cannot achieve sustainable development. Management of the environment and of resources depends on *demand* as well as technology. Attitudes and behaviour patterns towards consumption of resources and protection of the environment change as people enjoy more options. Informing the public about environmental costs and impacts of technologies and offering them sustainable alternatives can help.

All societies face the immediate task of developing and applying cleaner, more energy-efficient and environmentally benign technologies. The larger goal is to rethink production technologies and processes, and integrate environmental and economic considerations. A senior economist at ILO has said that for products or processes to be "environmentally benign" implies not only sustainability in terms of natural resources utilization, but technical viability and profitability to those who use them—as well as to society as a whole.

HUMAN RESOURCES DEVELOPMENT: THE FUTURE IS IN THE MIND

UNITED NATIONS

"The most difficult thing in life is to discover the obvious."

Mahbub Ul Haq, from the 1988 Paul Hoffman Lecture at the United Nations

"People are both the means and ends of economic development", in the words of Mahbub Ul Haq, former Finance and Planning Minister of Pakistan, Special Adviser to UNDP's Administrator, and chief of the team responsible for UNDP's *Human Development Report 1990*. With the rediscovery of human resources development as a critical factor in economic and social growth, the international pendulum has begun to swing back to a recognition that material wealth is not an accurate measure of development unless human potential is maximized.

The pendulum swings

The UN International Development Strategy for the 1960s included a special section on "human development", advocating education, skills formation and health care as means to ensure sustainable growth and development:

- **"The ultimate objective of development must be to bring about sustained improvement in the well-being of the individual and bestow benefits on all, in all spheres of economic and social life . . . in employment and education, in health and housing . . ."**

But human resources development—as a priority in national planning and development assistance—actually suffered in the 1950s and 1960s. Investment was concentrated in physical capital: roads, factories, machinery, mineral extraction, power generation and irrigation schemes. Benefits from these investments failed to "trickle down" as expected and the quality of life for the majority of the developing countries' populations worsened. Meeting people's basic needs took second place. The pendulum swung in the 1970s towards alleviation of poverty and concentration on basic needs.

The 1980s saw sluggish and uneven economic growth. The economies of many developing countries slipped backward. In 1976 average per capita income in developing countries was 10 per cent of that of the North, compared to only 5 per cent today. Despite the growing income gap between North and South, gaps in life expectancy, literacy and nutrition are narrowing. There is evidence that attention to immediate human needs pays off.

Between 1950 and 1988, the overall infant mortality rate in the developing countries was cut in half, from nearly 200 deaths per 1,000 live births to 80, a feat that took the industrialized world nearly a century to accomplish.

In the developing countries, between 1960 and 1987:

- **Average life expectancy rose from 46 to 62 years.**
- **Adult literacy climbed from 43 per cent to 60 per cent.**
- **Primary health care was extended to 61 per cent of the population, and safe drinking water to 55 per cent.**

The message of hope contained in the *Human Development Report 1990* is that although progress to date leaves no room for complacency, an acceptable level of human development can be achieved in a manageable time-frame and at modest cost.

- **Sri Lanka, with a per capita income of $400, far below the ''optimal growth'' objective of $12,000 per annum, has achieved an average life expectancy of 70 years, adult literacy of 87 per cent and an infant mortality rate of 34 per 1,000. Several other countries have higher income per capita, but their average life expectancy and literacy rates are significantly below those of Sri Lanka.**

Human development is not only affordable at lower GNP levels, it is critical to economic growth and ''sustainable'' development. The need to integrate economic policies and ecological considerations places an even greater premium on human resources development. As *Our Common Future* points out, human resources development builds up technical knowledge and capabilities, but also helps create new values and enables individuals and nations to cope with rapidly changing social, environmental and developmental realities. This applies to all societies—developing and industrialized alike.

An environmental safety net for workers

Transition to more environmentally sound industries and processes in industrialized nations may lead to the creation of more profitable production methods and consequently of more jobs, or it may cause displacement. Either outcome requires increased investment in retraining and educating the workforce. ILO has recommended that priority be given to workers who lose their jobs or who require training to adjust to new industry practices or to new employment.

- **At a 1989 ILO *Meeting of Experts on Employment and Training Implications of Environmental Policies in Europe*, representatives of Government, labour and industry explored employment/environment linkages. Protecting environmental resources may, in fact, help save jobs: regulations such as limits on drift-net fishing to prevent depletion of fish stocks, or measures to prevent environmental accidents such as toxic ''spills'' which close down factories are just two examples. In other cases, however, where environmental regulations result in lost jobs, community involvement will be essential to create new employment and training.**

Eastern Europe faces significant job losses where urgently needed environmental protection means closing inefficient and uneconomical plants. Some job losses may be offset by major, but short-term, employment in large-scale environmental rehabilitation projects.

- **Poland's Gdansk and Silesia regions have already seen plant closings aggravate unemployment.**
- **A large irrigation project in the Soviet Union has drained the Aral Sea and increased salinity in agricultural land, devastating the local economy, eliminating a large number of jobs and forcing part of the local population to move elsewhere.**

Education: the future is in the mind

Members of a community can participate fully in choices that affect them only if they have adequate information and the self-confidence that comes from knowledge. Literacy is essential for preparing people to protect their environment.

- **An estimated 962 million people over the age of 15, of whom more than 90 per cent live in developing countries, cannot read and write.**
- **Some 10 per cent of the industrialized world's population is functionally illiterate.**
- **UNESCO has intensified its efforts to bring the written word within the reach of millions. The United Nations designated 1990 as International Literacy Year. To co-ordinate the UN system's activities in promoting education, especially among women and children in developing countries, a World Conference on Education for All: Meeting Basic Needs, was jointly convened by UNDP, UNESCO, the United Nations Children's Fund and the World Bank in Jomtien, Thailand.**

Education often needs to be complemented by training programmes to improve communication skills and participation:

- **When toxic chemicals from a tannery contaminated the waters of a creek in Kentucky in the United States, poisoning fish and killing cattle which drank the polluted water, local residents overcame their reluctance to speak out when one farmer formed a citizen's group and lobbied the Federal Government to intervene. The tannery was finally forced to stop abusing the environment and the community followed up by building a sewage treatment plant. Members of the group later attended educational workshops that have built confidence and provided guidance on community action related to the environmental impact of hazardous wastes.**
- **In 1975 UNESCO set out with UNEP to promote education on the environment. Such efforts included helping countries to devise strategies for environmental education and training. UNEP's Education and Training Unit promotes exchanges of teaching plans among African countries to "environmentalize" education.**

As new technologies transform the workplace and daily life, workers—and especially young people—have to learn to think, solve problems and adapt to change. Participants in the World Conference on Education for All stressed "localization" in the acquisition of such skills as a means of closing gaps between and within countries and of developing human resources.

Educating for responsibility in shipping

International maritime shipping has changed more in the last 30 years than in any similar period in history. Ships are larger, faster and more complex. Their cargoes are more diverse. The number of countries involved in shipping has grown, as developing countries have established merchant marines. Concern about the marine environment has also grown. Since the 1950s, important multilateral conventions concerning shipping and marine pollution have been adopted.

- **The *International Maritime Organization (IMO)* has strongly emphasized training for shipping personnel. Qualified personnel on shore and at sea are crucial to the effectiveness of regulations concerning marine safety and prevention of marine pollution, since most international shipping agreements are complex and highly technical. Training is also essential for senior maritime officials: administrators, inspectors, instructors and other key figures. Developing countries lack enough personnel at this level, and the facilities to train them.**

- **In 1983 IMO, at the invitation of the Swedish Government, established the *World Maritime University (WMU)* in Malmö. Funded by the Swedish Government and UNDP, WMU is the first international effort to train high-level personnel responsible for effectively implementing IMO standards in developing countries. The shortage of well-trained senior personnel not only seriously handicaps economic development in the countries concerned, but could have a disastrous impact upon maritime safety and marine pollution. WMU admits about 100 students annually and has trained officials from 104 countries. In addition to its regular programme, it conducts special seminars in marine pollution, maritime law, the law of the sea and general marine affairs, in cooperation with Canada's International Centre for Ocean Development and the UN Office for Ocean Affairs and the Law of the Sea.**

"Ngambika": help me to balance this load

A Central African expression, "ngambika", translated as "help me to balance this load", is usually associated with the task of lifting a heavy load onto a woman's head—a metaphor for women's pivotal role in environmentally sustainable development.

FAO's 1989 report on the *State of the World's Food and Agriculture* details how the cycle of poverty and land degradation affects women:

- **Women spend many hours a day gathering fuelwood and water. As supplies grow scarcer, they may have to devote more time to these chores at the expense of crop cultivation. If water supply is not accessible, the family's health may suffer. If wood is unavailable, it may have to be purchased, reducing the family's income. If the soil cannot even support subsistence farming, the male members often migrate to urban areas or even go abroad in search of cash income. Women are left to manage farms. Some one third of rural households are headed by women.**

Development plans have usually focused on the male as the head of the household. Women are frequently treated as passive recipients of development projects even though their relationship with the environment is directly affected. Decisions on how to deal with resource degradation are often made by men without input from women in the community. Investments in low-

or ''soft''- technology options do not always get a fair hearing when they are identified with the needs of the female members of a community.

- **A biogas project in Etawah, Uttar Pradesh, India, was entirely operated by men. It ran well for a year, but then closed down. Community leaders seemed to be more interested in energy for irrigation pumps than for cooking. A World Bank study in West Africa found that improved stoves did not catch on partly because the users, mostly housewives, required more than just fuel efficiency and looked for comfort and convenience as well.**

An often-cited World Bank estimate that women do two thirds of the world's work and earn one tenth of the world's income actually underlines the lack of accurate data about women in the workforce. Their real contribution to the GNP of developing countries, where they are underrepresented in paid labour and most active in the ''informal'' economy, is grossly undervalued. The obstacles they face in obtaining credit and land ownership, health care, education and training—as well as resources such as agricultural inputs and livestock—are even less well known.

- **In attempting to change behaviour in environmental management, FAO urges policy makers to recognize the role women play, which is often crucial to conservation efforts. A greater effort should be made to analyse the division of labour and established patterns of authority between the sexes in rural areas.**

- **UNCTAD has advocated a set of priorities for investment in ''human capital''. Since women's incomes most often meet basic needs such as food, clothing and health care, income-generating schemes for women should be explored. To prevent marginalization of rural women and promote sound management of resources, UNCTAD proposes that Governments help women with ownership rights and control of land, livestock, marketing and transportation. Since women are primarily concerned with such environmental factors as energy sources, water supplies, cultivation and food security, they must understand how development schemes affect them—and be allowed to participate in decisions.**

Women's participation is essential to the success of virtually all schemes to promote development of human resources. Most important, where women are the primary users, appropriate technologies are needed. A community's needs can often be best determined by asking its women about their needs.

- **The *International Drinking Water Supply and Sanitation Decade (1981-1990)* started by emphasizing the number of installations, wells, pumps and equipment delivered. Not until 1987 did the emphasis shift to *responsibility* for use and maintenance, with its implications of community participation and women's involvement.**

- **In the Philippines, businessmen contributed a percentage of their profits towards a project to improve drinking water supplies. As the project developed, women expressed interest in serving as planners and administrators, as well as beneficiaries. They became the conduit for teaching others how to use and maintain equipment.**

Putting the cradle first

Children naturally have a stake in the environment. ''Their survival, protection and development depend on it,'' says a UNICEF report which outlines a strategy for integrating children's needs with environmentally sound development. A ''silent emergency'' of environmental degradation is claiming children's lives through unsafe drinking water, unsanitary surroundings, fatal diseases, pollution that causes respiratory ailments and poverty that marginalizes families and entire communities. Apparently unanimous agreement that resources must be found to meet the needs of the youngest members of society has not been matched by commensurate action.

- **UNDP's *Human Development Report 1990* notes that military activities absorb an enormous proportion of the world's wealth which could otherwise aid sustainable development. Developing countries' military spending is estimated at almost $200 billion—more than they spend for health and education combined. There are eight times as many soldiers as physicians in the developing world.**

In 1988, when IMF calculated the total external debt of developing countries at some $1.3 trillion, UNICEF estimated that at least 500,000 children under five died that year as a result of the slowing down or reversal of economic growth in the developing world. Children suffer directly from poverty and environmental degradation. UNICEF calls for ''structural adjustment with a human face'' aimed at improving the legal and physical environment for children, and for preventive action rather than waiting for disaster. Immunization, protection of water sources, personal and food hygiene, use of biogas and fuel-efficient stoves, and inclusion of environment in the school curricula are some measures UNICEF promotes to reinforce the links between environment and children's development.

- **Where population pressure strains land and fuel supplies in developing countries, children are sent out in search of scarce food, water and fuel. In Bangladesh, girls spend an average of over six hours a day collecting fuel; in Nepal, it takes them over three hours; in the United Republic of Tanzania, almost two hours. Today's children may also be the first generation to be educated for urban-based, white-collar jobs as part of a migration pattern, or drift to cities, in search of jobs to supplement meagre rural incomes of families left behind.**

- **The UN system is particularly concerned about children in the workplace. Estimates of the number of ''economically active'' children are as high as 50 million according to ILO, or 75 million to 100 million according to WHO. Children are more exposed to risks at work and more vulnerable to pollutants than adults. Children often work in businesses such as electric-battery workshops or printshops where they are exposed to high levels of lead. Children working as garbage collectors are subject to infections and exposure to toxic chemicals.**

UNICEF and ILO have advocated and designed legal instruments that set certain basic conditions for children who work to supplement family income. Such standards seek to establish a minimum working age, and protect children's rights to health and education.

- **The 1973 *ILO Minimum Age Convention* prohibits all work by those under age 12, and any work which prejudices the schooling and development of children under 15. Many countries have passed similar national laws but still encounter problems with implementation.**

- **The 1989 *Convention on the Rights of the Child* states that children should be "protected from economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's education, or be harmful to the child's health or physical, mental, spiritual, moral or social development". States are urged to define minimum ages of employment and to regulate working conditions.**

Recipe for growing populations: a bigger pie, divided better

Although not enough is known about the complex interrelationships between population, resources and the environment, increasing human demands are damaging the natural resource base. Excessive consumption, waste and energy use by the industrialized countries contribute to environmental degradation. High fertility rates and population growth in the developing world strain resources to the limit. In the poorest areas, according to UNFPA, the "scissors effect" of poverty and increasing population is slicing away at the environment's ability to sustain human life.

- **With fewer than 25 per cent of the world's people, industrialized countries consume 75 per cent of its energy, 85 per cent of its wood products and 72 per cent of its steel production.**

Environmental stress contributes to uneven population distribution, particularly to rapid urban growth, in developing countries. Swelling numbers of urban dwellers and inadequate sanitation, compounded by industrial pollution, strain the choked amenities of developing-country cities.

- **By the end of the century, half the world's people will live in urban areas. One fifth will inhabit megacities of 4 million or more.**

- **Poverty forces rural-to-urban migration and strains city and countryside alike. Husbands or sons are the first to leave for the city, altering the male-female balance in urban and rural areas. Rural poverty often deepens when absent menfolk fail to send money to wives or relatives. Women are not permitted to own land in some countries and in others they are often prevented from exercising their legal rights. As a result, rural households headed by women are poorer than those headed by men.**

Landless farmers often suffer first from resource depletion. Land redistribution is an integral part of investing in human development. Granting title to land also provides an incentive for conservation:

- **Sri Lanka has revived a traditional system of cultivation which gives responsibility to the community. Landless cultivators are leased three acres of degraded land for up to three years to grow subsistence crops. To preserve biological diversity, leaseholders must replant the watershed with seeds and saplings the Government provides. They are paid for each acre cultivated, and must replace any tree that dies. After the lease expires, they can move on to another patch of land. In this way, the forest is replanted at a fraction of the cost of reforestation schemes, and the landless poor benefit from a real alternative to degrading their environment.**

Human development = sustainable development

UNFPA has stepped up its drive to get Governments to make "social investments" like family planning, education and health. In a report entitled *Investing in Women: The Focus of the Nineties*, UNFPA argues that such investments must go beyond lowering infant mortality, reducing fertility and spacing children. If the environment is to be protected, human potential must be fully realized: women need equal access to land and to rewarding employment; men and women need alternatives to rural unemployment; communities need improved systems of land tenure, basic services and political participation.

The central message: development that benefits only the few is not sustainable.

GROUND RULES FOR COOPERATION: LAW FOR ENVIRONMENT AND DEVELOPMENT

UNITED NATIONS

"Next to personal example, law is the most powerful teaching tool in society."

J. William Futrell, President
Environmental Law Institute

Institutions are essential to any community: they set standards, provide means for settling disputes and exchanging information, and organize efforts to deal with problems. International agreements, most of them concluded in the last 20 years, have become an important tool in organizing the efforts of nations to regulate or eliminate practices which harm the "global commons", while promoting environmentally sound development. This chapter deals with just a few of the main agreements promoted by the UN system.

- **The *World Commission on Environment and Development* recommended an expansion in the legal framework for international cooperation towards sustainable development. The General Assembly has been urged to draw up a "Universal Declaration" and later a "Convention on Environmental Protection and Sustainable Development". UNCED's Secretary-General has proposed that the Conference seek agreement on principles to guide people and nations in their conduct towards each other and towards nature, drawing from and building on the 1972 Stockholm Declaration. UNCED is expected to adopt a brief *"Earth Charter"*: a historic symbol of the international community's commitment to, and hopes for, the future of life on our planet.**

- **More than 140 multilateral environmental agreements exist today. One third of them were negotiated under the auspices of UNEP. Others were promoted by UN bodies such as UNESCO, ILO and IMO.**

These treaties have established mechanisms for coping with environmental problems and engaged Governments in co-operation; they constitute an impressive network of rights and obligations of States. Conventions and agreements are legally binding for States that ratify them. Once a country ratifies a treaty, it becomes the law of the land.

Preserving wetlands and natural sites

UNESCO promoted two legal instruments adopted in the 1970s.

- **The 1971 *Convention on Wetlands of International Importance especially as Waterfowl Habitat* obligates contracting parties to use wisely all wetlands (inland, coastal and marine) under their jurisdiction. Each contracting party also agrees to designate for conservation at least one wetland of interna—**

tional relevance. By 1989 over 50 States had designated more than 420 sites, covering almost 30 million hectares.

- **The 1972 *Convention Concerning the Protection of the World Cultural and Natural Heritage* obligates States parties to protect unique natural and cultural areas, and establishes the international community's obligation to help maintain them. It designates exceptional World Heritage Sites and mandates protection of animals and plants in those sites. The Convention also established the World Heritage Fund, to ensure that such sites are not lost because of local lack of money or skills. Each State party must give to the Fund 1 per cent of its contribution to the UNESCO budget. The Fund spends about $2 million a year on protection activities.**

Protecting endangered species

Illegal trade in wildlife is probably the second largest illegitimate business, after illicit drug trafficking. Such trade threatens many endangered species—including the giant panda and the rhinoceros—with extinction. Migratory animals are also threatened. Two treaties negotiated under the auspices of UNEP seek to protect endangered species.

- **The 1973 *Convention on International Trade in Endangered Species of Wild Fauna and Flora* entered into force in 1975. It aims to protect endangered species from over-exploitation resulting from the animal and plant trades by a system of import-export permits. Under the Convention, a world-wide network of national management enforces uniform trade controls, with the help of standardized import-export documents and identification manuals.**

- **The 1979 *Convention on the Conservation of Migratory Species of Wild Animals*, which entered into force in 1983, protects species that migrate across national boundaries. It forbids the taking of endangered migratory animals and requires States to cooperate in their conservation.**

Curbing traffic in illegal waste

- **The residents of Koko, a small port in Nigeria, complained in 1988 that leaking sacks and containers of waste stored in their area gave off odours that made them ill. A government investigation revealed that between 1987 and 1988 some 3,800 tons of toxic waste from Italy were dumped in Koko—including at least 150 tons of a carcinogenic chemical. An illegal deal between an Italian waste contractor and corrupt officials had caused the contamination.**

This is only one incident in a dangerous, expanding trade. The growing volume of hazardous waste in industrialized nations, coupled with high disposal costs, has led some companies to export industrial residues to developing countries. Statistics are incomplete, but in 1989 the international NGO Greenpeace estimated global movement of hazardous waste at 3 million tons a year. UNEP reckons that some 800,000 tons move annually within Europe alone.

Some of this traffic is illegal, as highlighted by recent cases of waste dumping which have come to light in Africa and the Caribbean. The sums that change hands in these transactions can only be guessed at; the environmental costs are evident. Lack of monitoring or waste treatment

and conditions in receiving States often mean that large quantities of imported waste contaminate the local environment, pollute groundwater supplies or create other health hazards.

- **To tackle this problem, UNEP brought about the 1989 *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*. The treaty restricts shipping and dumping of hazardous waste across borders. It permits shipment only when the transport and the ultimate disposal of such wastes are environmentally sound. It provides for strict control measures, and imposes on an exporting country the obligation to reimport waste if the transaction is not completed in accordance with the contractual agreement.**

- **It also obligates States parties to adopt legal measures to prevent and punish illegal traffic in hazardous wastes. The Convention will enter into force when ratified by 20 States.**

Containing nuclear accidents

The 1986 Chernobyl accident underscored the need for an early warning system and international assistance plan in case of a nuclear accident. Shortly after Chernobyl, two conventions were adopted under the auspices of IAEA, the UN body which deals with issues concerning the peaceful uses of atomic energy.

- **The *Convention on Early Notification of a Nuclear Accident*, in force since 1986, establishes an early warning system for all nuclear accidents whose effects might cross national boundaries. It requires countries to report an accident's time, location, radiation releases and other data essential for assessing the situation. Information about nuclear accidents must be provided as early as possible, to minimize transboundary radiological consequences.**

- **Under the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*, in force since 1987, countries must facilitate prompt assistance in case of a nuclear accident or radiological emergency, to minimize its consequences and protect life and the environment from the effects of radioactivity.**

These Conventions provide for rapid international response to nuclear accidents. They provide a framework for crisis management in response to accident information, and help coordinate national and international assistance.

Curbing acid rain

Emissions from burning fossil fuels are transformed in the atmosphere into sulphuric and nitric acids which fall to the ground in dry particles or in moisture. This "acid rain" damages forests, crops, lakes and buildings world-wide. It causes crop losses in China, wipes out plants and animals in Canadian lakes, destroys German forests and corrodes Mayan monuments in Mexico. In the mid-1980s Central Europe received more than a gram of sulphur each year on every square metre of ground—five times the natural background level.

- **A legal instrument has been negotiated to combat acid rain: the landmark 1979 *Convention on Long-range Transboundary Air Pollution* (the "Acid Rain Convention"), brought about by the UN Economic Commission for Europe. The agreement requires countries to cooperate in monitoring, studying and**

acting to reduce long-range transboundary air pollution. Virtually all European and North American countries have adhered to the Convention, the first multilateral treaty dealing with air pollution abatement.

- **Two related protocols help control sulphur- and nitrogen-oxide emissions responsible for acid pollution. The 1985 sulphur oxide protocol calls for a 30 per cent reduction by 1993 in emissions or their transboundary flows from 1980 levels. The 1988 nitrogen oxide protocol calls for a freeze on emissions in 1994 at their 1987 level.**

- **The Convention and the protocols have greatly helped reduce noxious gases in the ECE region and have spurred efforts for further reductions. Total sulphur dioxide emissions in the countries of the Convention dropped 15 per cent between 1980 and 1986. Some countries reduced their emissions by 50 per cent.**

ECE efforts in environmental law continue. A new ECE instrument, the *Convention on Environmental Impact Assessment in a Transboundary Context*, is expected to be adopted in 1991. ECE is now working on a *Convention on Transboundary Impacts of Industrial Accidents*, a *Convention on the Protection and Use of Transboundary Water Courses and International Lakes*, and a protocol to reduce hydrocarbon emissions and their transboundary flow.

Protecting oceans

The basic legal instrument to protect the oceans is the UN *Convention on the Law of the Sea*. It obliges States to prevent and control marine pollution from all sources: onshore human settlements and agricultural and industrial activities; exploitation of ocean minerals; dumping of wastes at sea; discharge from ships; and pollutants transmitted through the atmosphere. States are liable for damage caused by violation of their international obligation to combat marine pollution.

- **Adopted in 1982 and signed by 159 parties, the Convention will enter into force one year after 60 States ratify it. So far it has been ratified by 45. The treaty has already resulted in significant improvements in environmental protection.**

- **The Convention strikes a balance between protection of the marine environment and use of the ocean and its resources. It devotes an entire section to protecting the marine environment, which is the first comprehensive statement of international law on the issue.**

The Convention has had a major impact not only on marine environmental legislation but also on general environmental law and policy. Other instruments on the marine environment adopted by the international community have confirmed or developed its provisions. Although it is not yet in force, States increasingly turn to the Convention for guidance and legal principles.

- **In 1989 Australia and Indonesia signed a treaty on a zone of cooperation covering the sea between the two countries. The treaty refers specifically to the Convention, and envisages cooperation in environmental protection and pollution control.**

Reducing marine pollution

The state of the world's seas is a cause of grave concern. In 1990 a UN group of experts on marine pollution identified the major problems: coastal development and the attendant destruction of habitats; excessive plant growth caused by agricultural fertilizers and other land run-off which kills marine animals by depriving them of oxygen; contamination of seafood by microbes; garbage; noxious chemicals; and tar balls.

Land-based pollutants are the main causes of these conditions, particularly in coastal areas, but ships also contribute. IMO has been in the forefront of environmental law, promoting agreements to reduce pollution from ships.

- **The 1973 IMO *Convention on the Prevention of Pollution from Ships* requires tankers strictly to control their disposal of oil waste from tank cleaning and ballasting operations. These regulations have contributed to dramatic improvements: oil pollution has been cut by 60 per cent since 1981. The Convention has been accepted by 60 States, and now applies to more than 85 per cent of the world's merchant fleet. Ships also pollute the sea by discharging on-board garbage. As early as 1975, ship garbage was estimated at 5.6 million metric tons annually.**

- **An annex to the 1973 Convention represents an important step in the battle against pollution of the sea by garbage. The annex, in force since 1988, establishes strict controls over disposal of garbage generated aboard ships. It obliges States parties to provide facilities for receiving ships' garbage in port, and bans discharge of plastics into the sea.**

Containing oil spills

Recent oil spills from tankers like the Exxon Valdez and from Kharg-5 in the Persian Gulf and Porto Santo Island prompted IMO action. Negotiations are under way for a new IMO convention on international cooperation to combat major oil pollution incidents. The draft convention covers establishment of national oil pollution response centres, development of shipboard emergency plans, world-wide inventories of pollution response equipment, cooperation in research and development, personnel training and pre-positioning of emergency equipment. The convention will make it easier to dispatch experts and equipment to accident sites wherever they may be.

UNEP is also involved in protecting the seas. Eight framework conventions on regional seas, and numerous protocols, have been negotiated under its auspices.

- **The 1976 *Convention for the Protection of the Mediterranean Sea against Pollution* and the 1983 *Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region* cover States' basic obligations to protect the marine environment from pollution: those relate to monitoring, cooperation in emergencies, scientific cooperation, liability and compensation, dumping and land-based and airborne pollution sources.**

Protecting the ozone layer

International environmental law deals increasingly with global risks to the whole planet, such as global warming, the extinction of species and depletion of the ozone layer. UNEP's leadership in international environmental treaties has resulted in the two key agreements on ozone layer preservation.

- **The 1985 *Vienna Convention for the Protection of the Ozone Layer* provides a framework for international co-operation to monitor ozone layer depletion and for research, exchange of information and transfer of technology. The Convention entered into force in 1988.**

- **The 1987 *Montreal Protocol on Substances that Deplete the Ozone Layer* included a freeze on production of CFCs at the 1986 level and called on countries to cut their production in half by 1998. Developing countries, which are responsible for a relatively small proportion of CFC release, are allowed a 10-year grace period to comply with the treaty. The Protocol entered into force in 1989. Its 68 States parties to date account for nearly 90 per cent of consumption of CFCs.**

The Montreal Protocol has stimulated major changes, both in national laws and the operations of major chemical companies, and in efforts to find and develop safe alternatives to CFCs.

- **Du Pont, the world's largest CFC producer, announced in 1988 that it would phase out CFCs by the year 2000. Imperial Chemical Industries, Europe's leading producer, announced in 1988 that it would stop producing the most harmful CFCs. Both companies announced full production by the early 1990s of CFC substitutes that do not damage the ozone layer.**

- **Other companies, like IBM and Canada's Northern Telecom, are changing industrial processes to reduce CFC consumption. Bayer, General Electric, Akzon and Allied Signal have presented proposals for redesigning refrigeration, air-conditioning and dry-cleaning technologies to reduce or eliminate the need for CFCs.**

Going beyond Montreal

CFC substitutes and bans on CFC use in spray cans have already reduced emissions. But detection of a major "hole" in the ozone layer over Antarctica and depletion of the ozone layer over the northern hemisphere have spurred efforts to tighten the Protocol's provisions.

- **UNEP convened the first meeting of the Protocol's States parties in Helsinki in May 1989. Participants expressed a common will to strengthen the Protocol: 81 countries and the European Economic Commission agreed to abandon CFC production and use by the year 2000. They also called for a reduction in the use of other ozone-depleting chemicals, and for funding to facilitate transfer of ozone-friendly technology to developing countries.**

- **At the second meeting of States parties in London in June 1990, the participants agreed on an amendment to the Protocol to phase out the consumption of 10 ozone-depleting gases and carbon tetrachloride by the year 2000. Under the UNEP-brokered agreement they also decided to speed the development of safe substitutes.**

▶ **Another major achievement in London was the establishment of an international ozone defence fund, based on a UNEP proposal, with a three-year (1991-1993) budget of $160 million. For the first time, industrialized countries offered cash to developing countries to help meet environmental goals. The fund, which became operational in January 1991, is to be used to convert developing-country factories that produce CFCs and other ozone-damaging substances to more ozone-friendly chemicals.**

On the drawing board: protecting the world's species . . .

Scientists estimate that every day 100 species are lost forever. A quarter of the planet's 5 million to 30 million species are in serious risk of extinction within 30 years. The main cause is the destruction of habitats, as human population increases and people encroach on territory previously left to other species.

Genetic diversity is essential to agriculture, forestry, industry, medical science, and the environment as a whole. Its loss threatens crop breeding and such vital industries as pharmaceuticals.

▶ **In 1987, UNEP started preparing a convention to preserve biological diversity. A UNEP-convened Working Group of Experts is working on a draft treaty which, it is hoped, will be ready for signature at *Earth Summit* in June 1992.**

▶ **Among the issues being discussed are how to address the full range of biodiversity, so as to embrace all species and ecosystems; how to encourage conservation of biodiversity; and how to compensate for the cost of conservation, which will be borne mainly by developing countries—where the greatest part of the world's genetic heritage is found.**

. . . and the world's climate

The foremost environmental threat is climate change from the so-called *"greenhouse effect"*—projected warming of the atmosphere due to the emission into it of certain gases. An altered climate would disrupt agriculture and change rainfall patterns. It would raise sea-levels as polar ice caps melt, submerging lowlands. Significant portions of some countries—such as Bangladesh and the Netherlands—would be affected. Some island nations might completely disappear.

▶ **At the request of the General Assembly, UNEP and the WMO have started preparatory work on a framework convention on climate change. The main mechanism for these preparations has been the WMO/UNEP Intergovernmental Panel on Climate Change, set up in 1988.**

The treaty's initial goal would be to reduce world-wide emissions of greenhouse gases. Conclusions and recommendations on technical and political issues at the second World Climate Conference in November 1990 preceded the first negotiating session among Governments in February 1991. Deforestation, adaptation to sea-level rise, energy efficiency, the situation of developing countries and funding mechanisms are among the main issues under discussion. It is hoped that a convention with real impact can be signed by a large majority of countries at the 1992 UN Conference on Environment and Development.

- **The climate convention is expected to contain general principles and obligations framed so that the largest possible number of countries will adhere to it, and permit timely action. Separate, binding protocols would deal with specific obligations. Establishment of emission-reduction targets for individual States or groups of States is also under consideration.**

- **Other provisions would, for example, require industrialized countries to provide financial and technical assistance to developing countries, enabling them to cut emissions without forgoing the benefits of industrial development.**

The needs of developing countries

International environmental agreements generally acknowledge the special circumstances of developing countries. These countries acknowledge the need to protect the environment but cannot meet the same demands placed on industrial countries. Standards valid for industrial countries may be inappropriate, or entail unduly heavy social costs, for developing nations.

- **The Montreal Protocol entitles developing States to delay compliance with its control and reduction provisions, and establishes an international obligation to facilitate developing-country access to environmentally safe technologies.**

A fundamental human right

Environmental concerns are increasingly seen through the prism of human rights. Legal experts have formulated such principles as "the right to a healthy environment" and "the right to environmental protection" and have stressed the need for codifying these concepts in international instruments. The *UN Commission on Human Rights* is studying the relationships between human rights, development and the environment.

- **The Declaration of the 1972 UN Conference on the Human Environment in Stockholm stated that "Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being."**

- **The Brundtland Report in 1987 proposed articulating a "Fundamental human right: All human beings have the fundamental right to an environment adequate for their health and well-being". The UN General Assembly unanimously recognized in 1990 that "all individuals are entitled to live in an environment adequate for their health and well-being".**

Rapid growth in the number of international environmental treaties shows that countries recognize that international cooperation is the only way to deal effectively with problems that no country or group of countries can cope with alone. Scientific and political developments make progress in international environmental law more and more a necessity, rather than a choice.

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Status of selected multilateral instruments (as at 1 April 1991)

The *Convention on Wetlands of International Importance especially as Waterfowl Habitat*, adopted in 1971, entered into force in 1975; 54 contracting parties.

The *Convention Concerning the Protection of the World Cultural and Natural Heritage*, adopted in 1972, entered into force in 1975; it has 109 States parties and is the most widely accepted conservation treaty.

The *Convention on International Trade in Endangered Species of Wild Fauna and Flora*, adopted in 1973, entered into force in 1975; 99 States parties.

The *Convention on the Prevention of Pollution from Ships*, adopted in 1973, entered into force in 1983; 60 States parties.

The *Convention on the Conservation of Migratory Species of Wild Animals*, adopted in 1979, entered into force in 1983; 28 States parties.

The *Convention on the Law of the Sea*, adopted in 1982; ratified by 45 States, it will enter into force when ratified by 60.

The *Convention on Long-range Transboundary Air Pollution*, adopted in 1979, entered into force in 1983; 32 parties.

The *Vienna Convention for the Protection of the Ozone Layer*, adopted in 1985, entered into force in 1988; 74 parties.

The *Convention on Early Notification of a Nuclear Accident*, adopted in 1986, entered into force the same year; 37 States parties.

The *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*, adopted in 1986, entered into force in 1987; 33 States parties.

The *Montreal Protocol on Substances that Deplete the Ozone Layer*, adopted in 1987, entered into force in 1989; 68 parties.

The *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*, adopted in 1989 by 116 States; ratified by 7 States, it will enter into force when ratified by 20.

NON-GOVERNMENTAL ORGANIZATIONS: THE CRITICAL MASS

UNITED NATIONS

"What I want to know about a world catastrophe is how it affects me personally."

Groucho Marx*

How to change individual behaviour—multiplied five or six or seven billion times, magnified by technology and natural processes, divided by politics—is at the heart of the transition to sustainable development. Information, attitudes and options are three key factors in encouraging people to examine their own behaviour and consider new ways of doing things. NGOs have been the driving force behind the debate on environment and development, making information available, changing attitudes and generating viable options to unsustainable development. UNCED Secretary-General Maurice Strong has said that "people power" will be the key to the success of *Earth Summit*.

Information: reaching a critical mass

Since the Stockholm Conference, NGOs have played an indispensable role in identifying risks, assessing environmental impacts and taking action to deal with them, while maintaining public and political interest in environment and development issues.

- **A number of NGOs around the world—in Chile, Colombia, Germany, India, Malaysia, Turkey and the United States, for example—publish national "state of the environment" reports.**
- **Several international NGOs—including the *World Watch Institute*, *World Resources Institute* and *International Union for Conservation of Nature and Natural Resources*—have produced significant reports on the global environment, the natural resource base and specific aspects of environment and development. *World Resources 1990-1991*, the fourth in a series, is the first such report produced through collaboration between the WRI, UNDP and UNEP.**

As Michael Oppenheimer of the *Environmental Defense Fund*, a United States-based NGO, put it, the first role of NGOs concerned with environment and development is that of "public

* Quoted by Allison Jolly, Biologist, fact sheet for the Panel on Environment and Development, Society for International Development, 19th World Conference, 1988.

education, of turning a scientific problem into a political one. . . NGOs can, through public information, force these issues in a coherent fashion onto the political agenda.'' NGOs' flexibility and willingness to take risks give them a pioneering role. They are able to take risks in areas which Governments and intergovernmental organizations consider too politically sensitive.

- **The *International Planned Parenthood Federation* was formed in 1952, long before Governments or the United Nations became involved in family planning.**

- **Scientists sounded the alarm about the dangers of CFCs in the early 1970s, and NGOs helped generate the momentum to control CFC emissions. Partly through grass-roots efforts, NGOs pressured Governments in the industrialized countries, particularly the United States, to remove from the market aerosol sprays which used CFCs. Similar grass-roots efforts by NGOs have been a key factor in government and industry action to deal with problems like acid rain and toxic wastes.**

Developing countries often feel resource depletion more acutely than pollution. Since the poor are most affected, it isn't surprising that in some developing countries such as India ''ecology movements'' have risen from among poorer people.

- **India's *Chipko Movement* (''chipko'' means ''to embrace'') was a response to loss of water resources, erosion and a decline in food production caused by destruction of forests in the Indian state of Uttar Pradesh. Throughout the 1970s local people, mostly women, stopped contractors from logging, often by hugging the trees. Subsequently, the Government imposed a 15-year ban on commercial logging of live trees in the state's Himalayan forests.**

- **Kenya's *Green Belt Movement* was also a response to deforestation. The Movement, set up in 1977 by the National Council of Women of Kenya, organized tree-planting and established nurseries to counter forest losses and degradation of the soil.**

Rapid changes in technology and the complexity of environmental issues make information exchange especially important. NGOs are an important link in the information chain. They often pry loose information from government and industry and make it widely available or identify areas where more information is needed.

- **The *NGO Coordinating Committee on Toxics and Drugs*, formed in 1982, has 500 correspondents in over 50 countries who exchange information and redisseminate UN documents. Like other NGOs, it works with UN agencies such as WHO, FAO and UNEP, which assemble directories and guidelines for dealing with toxic substances such as pesticides. Its *Pesticide Action Network* corresponds with 300 groups in 50 countries on irrational use of pesticides and in support of traditional management techniques. Its ''Dirty Dozen'' campaign has been instrumental in persuading some countries to ban these most hazardous products.**

Popular participation: development for, by and of the people

Speaking at the UN Department of Public Information's annual conference of NGOs in 1989, a representative of the *East and Southern Africa Management Institute* said measures like using cow manure to produce biogas for use as fuel were the reality of responding to environmental

concerns in Africa. Developing and spreading environmental initiatives required enhancing the capacity of local people to manage their environment through information and education, and developing their capacity to influence policy. Participants in the conference frequently expressed the view that the most successful ecological movements were political in nature and part of larger movements for social change.

NGOs: the loyal opposition?

NGOs are increasingly recognized for their contributions to—and their criticisms of—official policy. The Brundtland Commission urged Governments to recognize and extend NGOs' rights to:

- **know and have access to information on the environment and natural resources;**
- **be consulted and participate in decision-making on activities likely to have a significant effect on their environment;**
- **have access to legal remedies and redress when their health or environment has been or may be seriously affected.**

The last several years have seen fundamental changes in attitudes towards popular participation in many countries. There are signs that major changes are under way in Africa, which has suffered from the vicious circle of environmental degradation, economic decline and political instability.

- **An *International Conference on Popular Participation in the Recovery and Development Process in Africa* was held at Arusha, Tanzania, in February 1990. Organized by the *UN Economic Commission for Africa* at the initiative of various NGOs, the Conference brought together more than 500 representatives of people's organizations, African Governments and UN agencies. The Conference called upon African Governments to "yield space to the people" and, at the same time, called upon Africa's people to press for democratic participation and to "establish independent people's organizations that are genuinely grass-root, democratically administered and self-reliant".**

A wide cross-section of non-governmental groups, encompassing industry, scientists, trade unions, voluntary environmental organizations and youth, were represented as full partners in preparing proposals for a meeting of government ministers from the ECE region convened by Norway in 1990, in cooperation with ECE.

- **Following up on the report of the World Commission on Environment and Development, and in preparation for UNCED in 1992, the *Ministerial Declaration of the Bergen Conference* emphasized the importance of participation by a well-informed and well-educated society in democratic decision-making related to environment and development issues. The *Joint Agenda for Action* adopted by the Conference gives top priority to environmental awareness and public participation in all sectors of society, and stresses the pivotal role of NGOs. It urges "open, inclusive and participatory processes" involving the greatest possible number of people—with special emphasis on women's participation—for decision-making on environment/development issues.**

Communication between NGOs and intergovernmental organizations, particularly on questions of environment and development, has also taken on new significance.

- **A joint *World Bank-NGO Committee* was established in 1981 to increase dialogue on development issues. In 1987 the Committee agreed on the need to draw upon the knowledge and experience of NGOs in the southern hemisphere and grass-roots groups, and agreed that the Bank should consult these organizations about needs, interests and perspectives of local populations before formulating programmes and policies. The Committee's 26 NGOs, which include 15 from the South, have formed a *Working Group on the World Bank* which is pressing the Bank to adopt new, environmentally sustainable development models.**

- **UNDP supports a regional African network to encourage grass-roots participation in development and strengthen research institutes. The *Africa 2000* network places emphasis on NGOs and women and promotes better communication among NGOs, government agencies, private business, academic institutions and the general public.**

The UN system has increasingly sought the involvement of business and industry in questions of environment and development. Activities of UNIDO; the Centre on Science and Technology for Development; UNEP's Office for Industry and the Environment and the IRPTC; ILO's meetings on the working environment, which involve representatives of Governments, labour unions and business; standard-setting by IMO and the International Civil Aviation Organization—are just a few examples.

- **Among the preparatory meetings for the Bergen Conference was a regional meeting of 200 chief executive officers from industries in 25 countries who adopted the Industry Agenda for Action, which urged world-wide support for the *Environmental Guidelines for World Industry* prepared by the *International Chamber of Commerce*. These apply to industry in developing countries as well as in industrialized nations, and cover private and State-owned enterprises.**

- **A second World Industry Conference on Environmental Management, jointly organized by UNEP and ICC in April 1991, brought together business leaders from major corporations as well as medium-sized enterprises to define what business is willing to do to promote environmentally sound development, make recommendations for government action, and formulate industry's main policy issues for consideration at *Earth Summit*.**

What is an NGO?

The term *non-governmental organization* is very broad. Strictly speaking, it describes any organization not a part of government or whose members are not Governments: private voluntary organizations; community groups; professional and trade associations; labour unions; and academic and scientific organizations.

- **UNEP supports the *Environmental Liaison Centre International* in Nairobi, Kenya, which maintains contact with some 6,000 NGOs world-wide, and the African NGO Network of 280 member organizations.**

Under Article 71 of the UN Charter, the Economic and Social Council makes arrangements for consultation with NGOs, which the Council has defined as "any organization which is not established by intergovernmental agreement".

- **Some 900 organizations have consultative status with the Economic and Social Council. Among them are large organizations interested in a broad range of issues, like the *International Chamber of Commerce* and the *Society for International Development*; and more specialized organizations like the *Associated Country Women of the World*, *Greenpeace International*, the *International Union for Conservation of Nature and Natural Resources* and the *Sierra Club*. Organizations obtain consultative status through action by the Economic and Social Council or the Secretary-General, or because of their consultative status with other UN bodies or specialized agencies.**
- **Corporations and universities have not been granted consultative status, but many associations which represent the business and academic communities have obtained such status.**
- **The UN also maintains contact with a wide range of NGOs through their association with the *Department of Public Information*, and through the *Non-Governmental Liaison Service (NGLS)*, a unit sponsored jointly by several agencies of the UN system.**

By working with NGOs, the United Nations benefits from their ideas, expertise and reach. NGOs with consultative status have the opportunity to consult with other organizations, and call the attention of the international community to issues which concern them. NGOs in industrialized countries have become increasingly involved in assisting developing countries.

- **In the mid-1980s, it was estimated that NGOs in OECD countries provided nearly $3 billion in grants for development and relief activities out of their own resources (equivalent to about 9 per cent of official development assistance provided by Governments), and served as the channel for an additional $1.5 billion in government assistance funds.**

NGOs and *Earth Summit*

The proposals at UNCED will reflect the contributions of a broad range of NGOs and constituencies, and the decisions taken by world leaders will be based primarily on the political will manifested by the interest and concern of their people.

- **The UN General Assembly has opened the preparations for UNCED to the NGO community to an almost unprecedented degree. Any NGO with "relevance" and "competence" in environment and development will be given the opportunity to address the Conference's Preparatory Committee, submit written presentations and participate in working group discussions. NGOs will not be permitted to take part in the Preparatory Committee's negotiations or vote on its decisions, however.**
- **National NGOs are working to have their views represented by their Governments' delegations to the Preparatory Committee and at the Conference itself, by participating in national advisory committees or lobbying.**

- **An *International Facilitating Committee for the Earth Summit* has been formed to coordinate NGO efforts world-wide. The Geneva-based *Centre for Our Common Future* is playing a major organizing role and puts out a newsletter, *"Network '92"*.**

- **The UN system's *Non-Governmental Liaison Service* focuses on disseminating information on substantive issues and policy advocacy. NGLS is publishing a regular newsletter, *E & D File*, during the preparations for UNCED.**

- **A global NGO conference is scheduled for December 1991 in Paris, organized by the *Environmental Liaison Centre International* in Nairobi and the Government of France. Over 1,000 NGOs are expected to attend the meeting and prepare a position paper for the Summit.**

- **Thousands of NGOs are expected to participate in parallel activities related to UNCED during the Conference itself.**

At a meeting of NGOs, after presenting *Our Common Future* to the General Assembly, Gro Harlem Brundtland urged NGOs to promote the transition to sustainable development.

- **"Are the Governments and international organizations publicly committing themselves to the ideals of sustainable development and privately going on with business as usual? Judge them; prepare report cards . . . I challenge all national NGOs to work with Governments in preparing national strategies for sustainable development and national audits of environmental resources and their uses."**

UNCED's Secretary-General has said that *"Public awareness is the source of political will; political will is the key to the Conference."* It is hoped that *Earth Summit* will move environment to the centre of economic decision-making, and alter the behaviour of Governments, economic sectors and individual consumers. But only with support from Governments, NGOs, business, trade unions, citizen groups and the public at large will *Earth Summit* fulfil its objectives. In his words: *"Nothing less than the fate of the world is at stake."*

SOURCES/READING LIST

UN Conference on Environment and Development

Earth Summit News, a newsletter on preparations for the UN Conference on Environment and Development, can be obtained by writing to the UNCED secretariat in Geneva (address below). Information materials about the Conference are also available from the UN Department of Public Information, Room S-1040, United Nations, New York, NY 10017, USA.

The UN Non-Governmental Liaison Service publishes *E & D File*, a newsletter specifically for the NGO community on the issues before Earth Summit '92 (see NGLS Geneva and New York addresses below).

Development Forum, a journal of news and opinion, is published 10 times a year by the Department of Public Information. Subscriptions are available by writing to P.O. Box 5850, GCPO, New York, NY 10163-5850, USA. A section of each edition will be devoted to the UN Conference on Environment and Development.

General

Several United Nations sales publications provide useful background information about current and past United Nations activities:

Basic Facts about the United Nations is a handbook containing a concise description of the work of the United Nations and its related agencies; *Everyone's United Nations*, a basic reference work, gives a more detailed historical account of the UN system's activities. *UN Chronicle*, the official quarterly magazine of the United Nations, covers current developments in the UN system. The *Yearbook of the United Nations* is a major reference work which provides detailed information about all aspects of the Organization's work (the most current Yearbook covers developments in 1986).

These publications may be obtained from bookstores and distributors throughout the world. Consult your bookstore or write to *United Nations, Sales Section, Room DC2-0853, United Nations, New York, NY 10017*, or *Palais des Nations, 1211 Geneva 10, Switzerland*. A catalogue of UN sales publications is available on request.

The UN Department of Public Information also publishes a variety of materials available on request, such as the Secretary-General's annual *Report on the Work of the Organization*. Many of these can be obtained from the 67 UN Information Centres located in capital cities around the world, or from the *Public Inquiries Unit, Department of Public Information, United Nations Headquarters, New York, NY 10017, USA*.

United Nations documents

Most UN Information Centres maintain reference collections of UN documents. A number of libraries around the world have also been designated as depository libraries for UN documents and maintain collections for consultation by the public. For a list of UN Information Centres, write to the Department of Public Information. Inquiries about depository libraries can be addressed to the *Dag Hammarskjöld Library, UN Headquarters, New York, NY 10017, USA*. Please note that the Dag Hammarskjöld Library itself is open to official users only.

Environment and Development: selected UN system publications

The following is a selected list of publications and documents used to prepare this edition of *Notes for Speakers*. Titles listed under one heading may include useful information on other topics as well. In addition to the materials listed here, valuable information is contained in the documents of the Preparatory Committee for UNCED, issued under the UN document symbol A/CONF.151/PC/—.

Most specialized agencies and programmes of the UN system, as well as many branches of the Secretariat, produce newsletters or periodicals (not listed here) covering their activities.

Overview

Action on the Environment: The Role of the United Nations. Lloyd Timberlake. Published by the International Institute for Environment and Development and UNEP. 1989.

Environmental Management in Development. The Evolution of Paradigms. Discussion Paper No. 80, Michael E. Colby. World Bank.

Environment and the World of Work. International Labour Office, 77th Session, 1990.

Global Outlook 2000. An Economic, Social and Environmental Perspective. United Nations, Sales No. E.90.II.C.3. 1990.

Only One Earth: The Care and Maintenance of a Small Planet. Barbara Ward and René Dubos. W. W. Norton & Company, 1972.

Our Common Future. Report of the World Commission on Environment and Development. Oxford University Press, 1987.

Our Planet, Our Health. WHO/Fetzer Foundation. 1990.

Safeguarding the Future. Nafis Sadik, UNFPA. 1990.

The World Environment 1972-1982: A Report by the UN Environment Programme. Tycooly International, Dublin. 1982.

World Resources 1990-91. World Resources Institute, in collaboration with UNEP and UNDP. Oxford University Press, 1990.

Economics of environment and development

Environmental Accounting for Sustainable Development. A UNEP–World Bank Symposium. Yusuf J. Ahmad, Salah El Serafy, Ernst Lutz, editors. World Bank. 1989.

"From crisis to consensus". Address by Thérèse P. Sévigny, UN Under-Secretary-General for Public Information, to the Institute for International Development and Cooperation, University of Ottawa, November 1990.

Net Transfer of Resources from Developing Countries. UN document A/45/487. 1990.

Operational Activities of the UN System. UN document A/45/273 and Adds. 1990.

Report of the Personal Representative of the Secretary-General on Debt. UN document A/45/380. 1990.

The State of Food and Agriculture 1989. FAO.

Striking a Balance: The Environmental Challenge of Development. World Bank. ISBN 0-8213-1271-5.

Sustainable Development and the Environment. UNDP.

The World Bank and the Environment: First Annual Report. World Bank, 1990. ISBN 0-8213-1614-9.

World Development Report 1990. World Bank/Oxford University Press. ISBN 0-19-520851-X.

World Economic Survey 1990. UN Department of International Economic and Social Affairs. Sales No. E.90.II.C.1, 1990.

Science and technology

The Atmosphere of the Living Planet Earth. WMO No. 735. 1990.

Development and International Economic Cooperation: Trade and Development—Negotiations on a draft international code of conduct on the transfer of technology. UN document A/45/588. 1990.

The International Atomic Energy Agency's Contribution to Sustainable Development. IAEA/PI/A19. 1989.

International Programme on Chemical Safety, Ten Years of Chemical Safety. WHO, ILO and UNEP.

New and Renewable Sources of Energy and the Environment: Note by the Secretary-General. UN document A/AC.218/1990/3. 1990.

Ongoing and Future Research: Transnational Corporations and Issues relating to the Environment Report of the Secretary-General. UN document E/C.10/1989/12. 1989.

Transnational Corporations and Technology Transfer. UN publication, Sales No. E.87.II.A.4.

Transnational Corporations and the Environment: Report of the Secretary-General. UN document E/C.10/1990/10. 1990.

Trends and Salient Issues in Energy Resources: Reports of the Secretary-General. UN document E/C.7/1991/9. 1990.

UNCTAD's Contribution to Sustainable Development. UNCTAD. TD/B/1267, August 1990.

UNIDO Policies and the Annual Report of the Director-General for 1989 on the Activities of the Organization: Environment Activities. UNIDO. IDB.6/3. 1990.

UNIDO Contributions to Environment and Industrial Development. UNIDO. GC.3/32. 1989.

WMO and Global Warming. WMO No. 741. 1990.

Human resources development

Achievements of the International Drinking Water Supply and Sanitation Decade 1981-90: Report of the Secretary-General. UN document A/45/327. 1990.

Children and the Environment 1990. UNICEF and UNEP, E.90.XX.USA.2.

Human Development Report 1990. Published for UNDP by Oxford University Press. 1990.

Investing in Women: The Focus of the Nineties. UNFPA.

Least Developed Countries 1989. UNCTAD. Sales No. E.90.II.D.4.

State of the World's Population Report 1988, 1989. UNFPA.

Law

Cleaner Oceans: The Role of IMO in the 1990s. IMO. J/4434. 1990.

Environmental Law in the United Nations Environment Programme. UNEP, Nairobi 1990.

Focus on IMO: Preventing Marine Pollution. IMO. J/2866/Rev.2. September 1989.

Protection and Preservation of the Marine Environment: Report of the Secretary-General. UN document A/44/461. 1989.

Progress Achieved . . . on Protection of Global Climate for Present and Future Generations of Mankind: Report of the Secretary-General. UN document A/45/696 and Add.1. 1990.

UN SYSTEM INFORMATION CONTACTS

UNCED Secretariat
160 route de Florissant
Case Postale 80
CH-1231 Conches
Switzerland

UNCED New York Office
Room S-3060
United Nations
New York, NY
U.S.A.

UNCED Information Officer
UN Department of Public Information
Room S-1040
United Nations, NY 10017
U.S.A.

UN Environment Programme (UNEP)*
P.O. Box 30552
Nairobi
Kenya

UN Development Programme (UNDP)
Division of Information
One United Nations Plaza
New York, NY 10017
U.S.A.

UN Children's Fund (UNICEF)
Division of Information
Three United Nations Plaza
New York, NY 10017
U.S.A.

World Food Programme (WFP)
Via Cristoforo Colombo, 426
00145 Rome
Italy

World Food Council (WFC)
Via delle Terme di Caracalla
00100 Rome
Italy

UN Conference on Trade and Development (UNCTAD)*
Palais des Nations
1211 Geneva 10
Switzerland

UN Centre for Human Settlements (Habitat)
UN Office at Nairobi
P.O. Box 30030
Nairobi
Kenya

UN Development Fund for Women (UNIFEM)
Room FF-0616
United Nations
New York, NY 10017
U.S.A.

International Research and Training Institute for the Advancement of Women (INSTRAW)
P.O. Box 21747
Santo Domingo, Dominican Republic

UN Population Fund (UNFPA)
220 East 42nd St., 19th floor
New York, NY 10017
U.S.A.

Africa Recovery

Department of Public Information
United Nations
New York, NY 10017
U.S.A.
(a periodical published by the UN in English and French)

* Organization maintains a liaison office at UN Headquarters in New York.

Specialized and other UN-related agencies:

Food and Agriculture Organization of the UN (FAO)*
Via delle Terme di Caracalla
00100 Rome
Italy

General Agreement on Tariffs and Trade (GATT)
Centre William Rappard
154 rue de Lausanne
1211 Geneva 21
Switzerland

International Atomic Energy Agency (IAEA)*
Vienna International Centre
P.O. Box 100
Wargramer Strasse 5
A-1400 Vienna
Austria

International Bank for Reconstruction and Development (World Bank)*
1818 H Street, NW
Washington, D.C. 20433
U.S.A.
(including International Development Association (IDA) and International Finance Corporation (IFC))

International Civil Aviation Organization (ICAO)
P.O. Box 400
Montreal, Quebec
Canada H3A 2R2

International Fund for Agricultural Development (IFAD)
Via del Serafico 107
00142 Rome
Italy

International Labour Organisation (ILO)*
4 route des Morillons
CH-1211 Geneva 22
Switzerland

International Maritime Organization (IMO)
4 Albert Embankment
London, SE1 7SR
United Kingdom

International Monetary Fund (IMF)
700 19th Street, NW
Washington, D.C. 20431
U.S.A.

International Telecommunication Union (ITU)
Place des Nations
1211 Geneva 20
Switzerland

UN Educational, Scientific and Cultural Organization (UNESCO)*
7 place de Fontenoy
75700 Paris
France

UN Industrial Development Organization (UNIDO)*
P.O. Box 300
Vienna International Centre
A-1400 Vienna
Austria

Universal Postal Union (UPU)
Weltpoststrasse 4
Berne
Switzerland

World Health Organization (WHO)*
20 avenue Appia
1211 Geneva 27
Switzerland

World Intellectual Property Organization (WIPO)
34 chemin des Colombettes
CH-1211 Geneva 20
Switzerland

World Meteorological Organization (WMO)
41 avenue Giuseppe-Motta
CH-1211 Geneva 2
Switzerland

* Organization maintains a liaison office at UN Headquarters in New York.

NGO contacts for UNCED

Non-Governmental Liaison Service (NGLS)
Palais des Nations
CH-1211 Geneva 10
Switzerland

NGLS
Room DC2-1103
United Nations
New York, NY 10017
U.S.A.

Environmental Liaison Centre International
P.O. Box 72461
Nairobi
Kenya

International Facilitating Committee for UNCED
and the Centre for Our Common Future
Palais Wilson
52 rue des Pâquis
CH-1201 Geneva
Switzerland

Conference of NGOs in Consultative Status
with the UN Economic and Social Council
(CONGO)
Case postale 50
1211 Geneva 20
Switzerland

GLOSSARY OF ACRONYMS

CFC	chlorofluorocarbon
ECE	UN Economic Commission for Europe
EEC	European Economic Community
FAO	Food and Agriculture Organization of the UN
GDP	Gross domestic product
GNP	Gross national product
IAEA	International Atomic Energy Agency
ICC	International Chamber of Commerce
ICSU	International Council of Scientific Unions
IFAD	International Fund for Agricultural Development
IGY	International Geophysical Year
ILO	International Labour Organisation
IMF	International Monetary Fund
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IRPTC	International Register of Potentially Toxic Chemicals
IUCN	International Union for Conservation of Nature and Natural Resources
LDCs	Least developed countries
NGLS	Non-Governmental Liaison Service
NGO	non-governmental organization
OECD	Organisation for Economic Co-operation and Development
UN	United Nations
UNCED	UN Conference on Environment and Development, also referred to as "Earth Summit"
UNCTAD	UN Conference on Trade and Development
UNDP	UN Development Programme
UNEP	UN Environment Programme

UNESCO	UN Educational, Scientific and Cultural Organization
UNFPA	UN Population Fund
UNICEF	UN Children's Fund
UNIDO	UN Industrial Development Organization
WHO	World Health Organization
WICEM	World Industry Conference on Environmental Management
WMO	World Meteorological Organization
WMU	World Maritime University
WRI	World Resources Institute
WWF	World Wildlife Fund